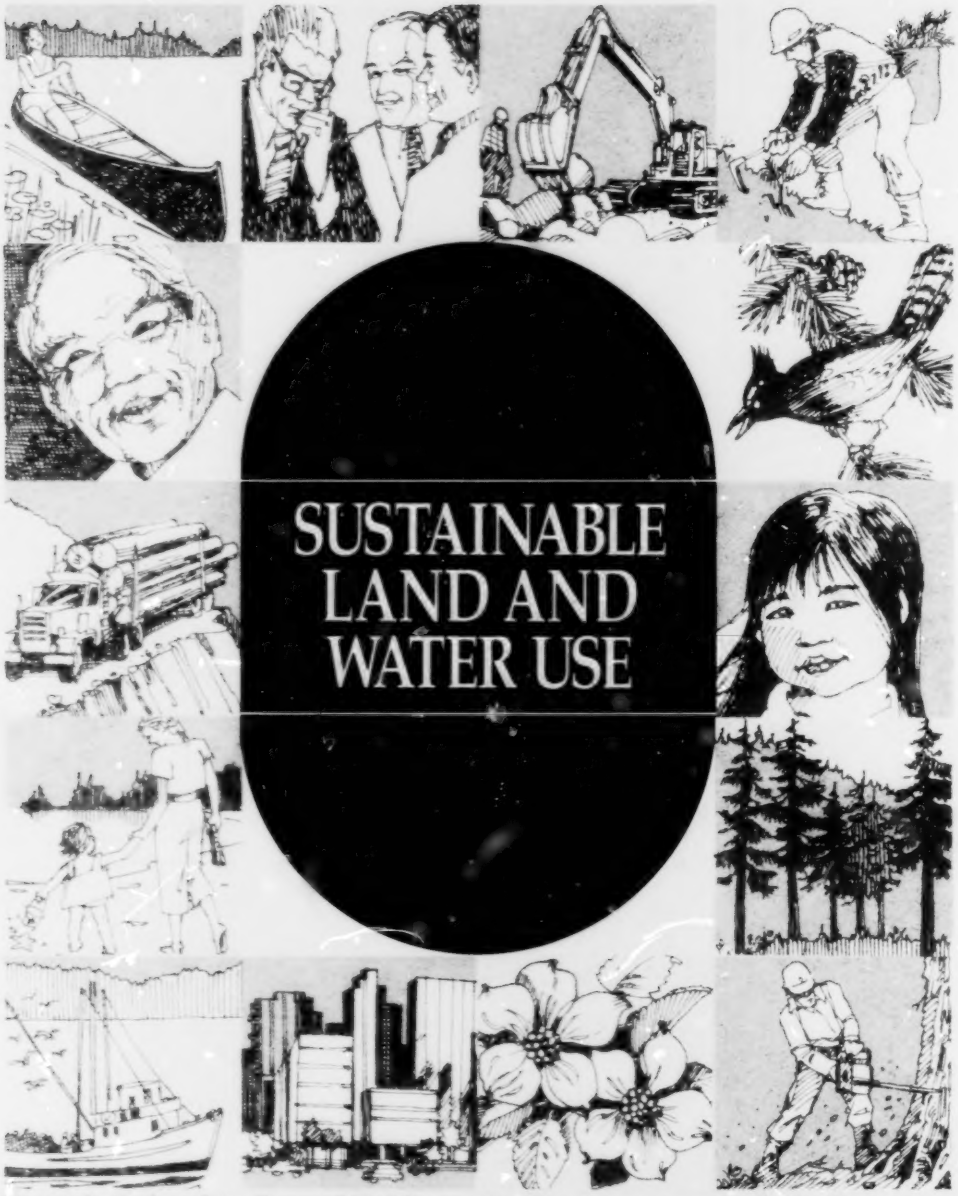

British Columbia Round Table on the Environment and the Economy

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SUSTAINABLE LAND AND WATER USE

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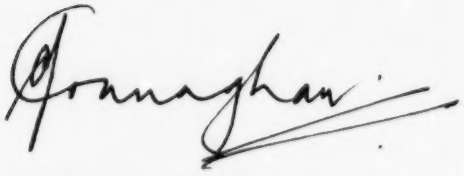
PREFACE

Sustainable Land and Water Use is a theme paper developed by the British Columbia Round Table on the Environment and the Economy. Its content reflects a consensus by the Round Table members on a number of major issues and options related to land and water.

This paper is intended to stimulate public discussion on the elements of a Sustainable Development Strategy for British Columbia. It is hoped that **Sustainable Land and Water Use** will provide a starting point for dialogue and will assist in determining the goals and values held by the public. The ensuing dialogue may reveal other appropriate issues to be addressed by the Round Table. **Sustainable Land and Water Use** is a companion to the Round Table's document **A Better Way**.

The Round Table welcomes your views and advice on this and other subjects related to a sustainable development strategy for British Columbia.



C. J. Connaghan
Chairman

EXECUTIVE SUMMARY

The Round Table has prepared this theme paper on land and water use to assist public discussion on a sustainable development strategy for British Columbia. In striving for a sustainable future, we must achieve a balance between the environment and the economy. Nowhere is that more evident or necessary than in the stewardship of the environment.

Everyone can appreciate the beauty and richness of British Columbia's land, air, and water. But perhaps we have not recognized the extent to which our economy is directly tied to the health of the environment.

Resource industries account for 20 per cent of our provincial gross domestic product, and they provide most of our exports. Economic analysis indicates that natural resource industries are a major driver in our economy, responsible for 23 per cent of all jobs. The natural beauty of the environment supports tourism, recreation, and other service industries, which are other major components of the economy.

Given the interdependence of British Columbia's natural environment, our economy, and quality of life, it is critical that we be good stewards of the environment. The challenges are immense. We are faced with a need to develop an ecological way of thinking, and a need to adopt an integrated approach to stewardship.

The issues are difficult. For example, biological diversity should be protected, but the business community is concerned that its secure access to the province's natural resources could diminish.

The pressures in the future will only grow; British Columbia's population is forecast to increase by 50 per cent in the next 25 years. How can we best establish who receives access to land and water? How can we best manage those resources once they have been allocated?

It has been suggested that a land and water use strategy is needed to help deal with these challenges. In simple terms, this strategy could be a map to tell us how best to use the land and water that are available. However a map is only part of a solution. A land and water use strategy should also include a clear understanding of sustainability goals and the methods to reach them.

A strategy for attaining sustainable use of land, water and air could include the following elements.

1. Principles for sustainable development

    - We need to collectively identify society's values that will guide decisions; these could be the six sustainable development principles identified by the Round Table in **A Better Way.**

2. Objectives to attain the goals

    - The principles of sustainability need to be translated into objectives and policies.

3. Long Range Planning

    - A wide range of approaches to planning are available to help reach decisions on allocation of land and water.

4. Allocation and reallocation

   - A final product of allocation is a map that designates lands and waters for appropriate uses; this may involve changes to existing allocations and associated terms and conditions.

5. Management of land and water

   - Management deals with how land or water is used for a designated purpose, and can determine the extent of environmental impact and economic benefit from use.

6. Monitoring and enforcement

   - This element determines whether allocation and management plans are being properly administered, if environmental values are being maintained, and whether use complies with guidelines and regulations.

Land and water use in British Columbia today is not based on the principles of sustainable development. The following are some of the steps that could be taken to achieve a sustainable future.

- integration in planning
- improving public involvement
- restructuring laws and institutions
- careful and effective implementation of plans
- decisions by consensus

The Round Table believes that a future based on sustainable development can be achieved. We have challenged British Columbians to help us develop a long term vision of this future. The vision contains, among others, clean water and fresh air, wide open spaces, healthy ecosystems, and a diverse economy that includes sustainable resource-based industries. A sustainable future also requires us to consider a variety of social issues. The Round Table has addressed these issues in **Sustainable Communities**.

INTRODUCTION

Air, land, and water are the fundamental support systems that sustain life. We make ample use of the province's abundant natural attributes to meet our demands for material goods and a comfortable standard of living -- especially our high quality health and educational systems. However, as we draw on the economic benefits derived from nature, the province's land and water systems are being diminished. There are not as many fish as there used to be, as much forested land, or as much clean water.[1] Sawmills are closing for want of trees, and industrial pollution is contaminating the rivers, ocean, and air. In time, the province's store of natural wealth could be severely depleted, its ecosystems put in danger. The economic framework built around the environment could begin to collapse.

This situation is made even more acute as various groups compete with one another to make use of the province's rich biological and geological heritage. Conflicts over the use of the public forests are a common occurrence in British Columbia; so are conflicts over the use of the rivers and ocean. Farmlands are under constant pressure for development.

The problems of land and water use in this province need to be solved, and there is no time to wait. We need to find a better way of sharing the natural wealth of British Columbia, and we need to find a better way of harmonizing the drive for economic development with the need to safeguard the natural environment.

That better way is called sustainable development.

The purpose of this theme paper is to help stimulate public thought and discussion about setting goals for sustainable land and water use in the province. It provides some background information on the current state of the environment and the economy, it highlights key components of a sustainable development strategy, and it addresses some of the difficult choices that must be faced along the way. The report summarizes some of the key issues of land and water allocation and management practices, and describes the process of change -- how we get from here to a sustainable future.[2]

The Round Table has specifically addressed the question of water use in this theme paper, as water quality and water quantity are major concerns in British Columbia. In the Lower Mainland and other industrialized areas of the province, issues of air quality are becoming increasingly important and must also be considered when developing a sustainable development strategy.

The Round Table has prepared other theme papers on sustainable development that cover the topics of energy, sustainable communities, and economic measures that promote sustainability. The Round Table's theme papers mark the starting point of a creative journey of discovery to a new way of living and working with the environment.

For more information on the Round Table, its publications, and how you can participate in designing a sustainable future for British Columbia, please turn to the back page.

The Vision of a Sustainable Future

Sustainable development is rooted in the concept that, over the long term, only a healthy environment allows us to have a healthy economy. The two are inextricably linked. If the environment is allowed to be degraded, society can no longer prosper economically. Right now sustainable development is little more than an idea, a vision of the ideal future. No industrial country has yet worked out a realistic way of balancing its economy with its environment. But in many countries, people and governments are urgently trying to make sustainable development a reality.

In British Columbia, the ideal sustainable future would see people operating more in harmony with each other and with the natural environment. There would be a fair and reasonable way of deciding who can use the land and water, and for what purposes. Some ecosystems would be protected for their special natural features while the rest of the province's land and waters would support a broad range of long-term economic activities. Underlying it all would be one unifying principle -- that the quality and productivity of the natural environment be safeguarded for all time.

The Round Table's Principles of Sustainable Development

In 1990 the British Columbia Round Table on the Environment and the Economy was established to help British Columbians fashion our own vision of a sustainable future. Made up of men and women from all walks of life, the Round Table began its work by identifying six principles of sustainable development, which are part of an ongoing discussion process. Each time society makes a major land and water use decision, we should ask if the resulting action:

- limits our impact on the living world to stay within its carrying capacity;
- preserves and protects the environment;
- minimizes the depletion of nonrenewable resources;
- promotes long-term economic development that increases the benefits from a given stock of resources without reducing our stocks of environmental assets;
- aims for a fair distribution of the benefits and costs of resource use and environmental protection, and;
- promotes values that support sustainability.

TRANSITIONS TO SUSTAINABLE DEVELOPMENT

Many of our economic activities, our lifestyle patterns, and the ways we allocate and manage the province's land and water are not consistent with the principles of sustainable development. To achieve a sustainable future, society will have to move through a transitional stage from a non-sustainable to a sustainable way of life. This transition will not occur overnight. Although it may well affect our material standard of living, in the long term it may also result in a higher quality of life. The challenge facing all of us is to find new and better ways of meeting our needs in the future. Meeting this challenge will require hard work, flexibility, and sympathy for the people whose lives may be deeply affected by the transition.

Some of the dilemmas that will arise, and the questions that they prompt are outlined below. As you read through this paper we invite you to bear these issues in mind. We value your responses to these and other questions that the paper raises.

Planning for the next century. Sustainability implies that we consider future generations in planning, but present economic plans commonly change from year to year. "Long term" planning usually means planning for five years, but many cycles of nature follow much slower time lines, perhaps spread out over hundreds of years. We need to link economic planning more closely with environmental planning, and that will mean extending our planning horizons far into the future to consider the effects of present day land and water use on our grandchildren, and on their grandchildren after that.

- Will the soils that grow food and forests today still be fertile 100 years from now?
- Will wildlife still have adequate habitat?
- Are we capable of planning for the next century?

Changing our habits. Sustainable development may not be easy for some people to accept. It is quite different from the concept of unlimited growth, which is the source of our economic well-being today. Accepting the concept of sustainability means that we accept the fact that every ecosystem has limits on the range of goods and experiences it can provide.

The impact that humans have on the world's life support systems is determined not only by population, but also by the level of human material consumption. About 20 per cent of the world's population lives in industrialized countries such as Canada, but they consume a huge portion of the world's resources.[3] A significant portion of British Columbia's lands and waters serve this engine of growth.

As each one of us begins to consider the environmental implications of our habits -- on global warming, waste, or water quality -- our consumption patterns may change, reducing the overall burden on the planet. Already a number of people are making the decision to switch from cars to transit, to recycle, to consciously reduce their overall levels of material and energy consumption. This is an encouraging start, a good foundation to build on, because unless we make profound changes in our patterns of consumption, we are unlikely to achieve the goal of a sustainable future for either British Columbia or the world.

- Should we endeavour to reduce, stabilize, or expand populations?
- How can we develop attractive alternatives to wasteful consumption?

Changing our institutions. The natural environment historically has been divided into resource-use sectors such as forestry, fisheries, and wildlife. A maze of government and private institutions has grown up around these sectors that range from local water boards to multi-national forest and mining industries. But managing for sustainable land and water use will require that ecological thinking and planning replace the traditional sectoral ways of dividing up the environment. This will likely require basic changes to many government and private institutions. The transition to these new institutions could be difficult, as any established institution typically is slow to accept change.

- Should British Columbia have new institutional arrangements for dealing with the environment and the economy?
- How should such innovations be introduced?
- How urgently are they required?

Effects on employment. Many rural communities were established because of the employment provided from resource-based industries. If changes in policies reduce these resource-based employment opportunities in the future, the people affected might require support in making the transition to new jobs and/or locations. This could include retraining, direct financial assistance, or increasing local employment through economic diversification.

- Who should pay for new employment opportunities for people displaced by changing the economy?

Compensation. If land and water are reallocated from current uses to alternative uses, compensation to the current resource users will have to be considered.

- Should resource-users be compensated? If so, how?
- Should the communities affected also be compensated? If so, how?

Learning While We Go. There is no blueprint for sustainable land and water use. We will only work it out as we go, which means continually experimenting with new ideas, new technologies, new ways of doing things.

- What are the best ways of extracting resources from an ecosystem without compromising the future health of that system?
- Are there alternative resource uses, as yet untried?
- How can we reduce our use of energy and materials?

These and similar issues are being discussed by many British Columbians as they begin to envision a sustainable future. We would like you to keep these questions in mind as you read through the rest of this paper, and to continue to consider what elements should be included in a sustainable development strategy for British Columbia.

THE ENVIRONMENT

The landscape of British Columbia covers 93 million hectares of mountains, forests, grasslands, farmlands, towns, and cities. Its inland waters make up an additional 1.8 million hectares of streams, rivers, lakes, and estuaries. The Fraser River system alone drains about one-quarter of the entire province.[4]

British Columbia contains one-third of all fresh flowing water in Canada, and the marine coastline of British Columbia winds its way along the shores of the Pacific for more than 7,000 kilometres.[5]

Almost two-thirds of the province is forested[6], and British Columbia's varied ecosystems and climate support a wide range of distinctive tree species. The hardy spruce trees of the north land, the stunted firs of the sub-alpine, the lodgepole pines of the interior, and the ancient cedars of the coast highlight a forest mosaic that comprises nearly 40 per cent of the total volume of forest biomass found in Canada. The big, old trees of the coastal rainforest and the interior wetbelt by themselves could hold as much as 20 per cent of Canada's total forest biomass volume, while occupying only four per cent of the nation's forested land.[7]

Similarly, the province's diverse geographic conditions provide a wealth of fish and wildlife habitat. There are approximately 445 species of birds, 144 species of mammals, 387 species of marine fish and 86 species of freshwater fish, (22 species of fish are common to both the marine and freshwater environments).[8] British Columbia contains more wildlife species than any other region in Canada, and many of the province's birds and mammals occur nowhere else in the country.[9]

Seventy-five per cent of the world's Stone sheep and 60 per cent of the world's mountain goats occur in British Columbia, and the province is home to 25 per cent of the world's populations of both bald eagles and grizzly bears. The coastal estuaries and mudflats are critical stopover areas for millions of migrating waterfowl.[10]

The long-term sustainability of British Columbia's abundance of fish and wildlife requires the sustained maintenance of their land and water habitats.

A thin layer of soil teems with life. This soil, which is unevenly distributed across the landscape, supports the forests and farms that are so essential to the province's economic future. The soil also holds large volumes of groundwater.

The geology of British Columbia is the most varied in Canada. Lavas, granites, shales, sandstones, and metamorphic rocks have been folded, faulted, gouged by glaciers, and transported by wind, water, and gravity. Within these complex geological structures are significant deposits of coal, copper, gold, silver, molybdenum, lead, zinc, natural gas, and oil.[11]

THE ECONOMY [12]

The most commonly used measure of economic performance is Gross Domestic Product, or GDP, which expresses the value of goods and services produced in a given region. Since 1961 British Columbia's GDP has been growing at an average annual rate of nearly five per cent.

In 1989 the service industries, such as trade and real estate, accounted for 68 per cent of the GDP, compared to 60 per cent in 1961. Over the same period British Columbia's resource-based industries have been growing at a slower rate (3.5 per cent) than the provincial average. Their share of the GDP is 20 per cent, down from 29 per cent in 1961. Forestry and mining alone account for over three-quarters of British Columbia's foreign exports. The manufacturing sector of the economy accounts for 14 per cent of the GDP, which is five per cent less than its contribution in 1961.

RESOURCE INDUSTRIES' SHARE OF GDP

	1961	1989
Forest Sector	**14.8**	**9.7**
Logging & Forestry	4.6	2.4
Pulp & Paper	5.3	3.0
Wood Products	4.9	4.3
Mining	**4.9**	**4.9**
Mining	3.4	4.1
Primary Metals	1.5	0.8
Agriculture	**7.3**	**3.0**
Agriculture	2.5	1.0
Fishing & Trapping	1.6	0.4
Food & Beverage	3.3	1.5
Utilities	**1.6**	**2.9**
TOTAL RESOURCE-BASED	**28.7**	**20.4**

Although the overall share of the resource-based sector of the provincial economy has declined, its absolute size has increased. In other words, although the service sector is growing, we are drawing more heavily on our land and water base than ever before.

In the calculation of GDP, some industries, such as tourism, cannot yet be separated from their component parts (transportation, lodging, etc.). Similarly, although one sector of the economy, such as the forest industry, may stimulate other economic sectors, such as transportation and construction, these spin-offs are not reflected in the GDP.

In 1989 the non-tax revenues from the natural resources industries flowing to the provincial government were about $1.2 billion. Slightly less than half of this total was from the forest industry. Total government revenues for that year were $13.5 billion, of which 59 per cent came directly from taxation.

Economic Drivers

The service sector is the largest employer in the province, and some of those service jobs depend on the resource sector. In fact, although 13 per cent of provincial employment derives directly from the resource sector, that figure rises to 23 per cent once the resource-dependent jobs are included. Natural resources industries are the "drivers" of the provincial economy, which gives them a level of importance that goes far beyond their direct contribution to the GDP. Clearly, sustaining the long-term health of the province's land and water systems is critical to the long-term health of the provincial economy.

As British Columbia builds a sustainable future, over time it may wish to become less directly dependent on extracting and exporting natural resources and develop a more diversified economy. The province then might be better protected from the ups and downs of international resource markets, and come under less pressure to develop its lands and waters.

One step toward diversification would be to increase the manufacturing sector. According to the principle of doing more with less, the province conceivably could generate more employment and export income from a smaller supply of natural resources by producing more value-added goods (such as more manufactured wood products and innovative materials made from wood waste).

Another approach to economic diversification would be to use the quality of life and the beauty of the province as a magnet to attract more service industries. This strategy suggests that future economic development may well depend on the quality of the environment we protect.

The Global Economy

The use of British Columbia's lands and waters is strongly linked to the global economy, as the bulk of all resources extracted are exported from the province either directly or as manufactured goods. A sustainable development strategy for British Columbia may affect the rate and manner of land and water use within the province, but it will not reduce the growing global demand for lumber, pulp, fish, energy, and minerals. British Columbia's industries compete with companies in other countries that show less concern for environmental quality and human welfare. The links and conflicts between the global economy and a sustainable future in British Columbia need to be addressed as the strategy is developed.

THE RESOURCE INDUSTRIES

British Columbia's resource-based industries are essential for sustaining the social fabric of the rural communities scattered throughout the province and for providing revenues for education, health, and other social programs.

The leading resource-based industry in British Columbia is the forest sector. It accounts for 10 per cent of the provincial Gross Domestic Product and generates close to 50 per cent of the value of all goods manufactured in British Columbia.[13] Mining, tourism, agriculture, and fisheries all make significant contributions to the British Columbia economy.

There is considerable difficulty in accurately describing the economic importance of these resource-based industries because statistics do not completely reflect each industry's contributions to the overall provincial economy.

Forestry

More than 43 million hectares of British Columbia's productive Crown forest land have been allocated for commercial use by a variety of forest companies, primarily through Tree Farm Licences and Timber Supply Areas.[14] In recent years the area of public and private forest land logged annually has been in the order of 270,000 hectares[15] or roughly the area of the Greater Vancouver Regional District.[16]

The rate of logging in British Columbia has increased steadily through the years, from some 34 million cubic metres in 1960[17] to as much as 92 million cubic metres by 1987 (78 million cubic metres from Crown land and 14 million cubic metres from private land).[18] This is the equivalent of 1,600 trucks of logs passing by every hour of every 8-hour working day.[19] In 1990 the cut dropped to 78 million cubic metres (67 million cubic metres from Crown land and 11 million cubic metres from private land).[20]

With approximately 100,000 people in the work force in the late 1980s, the forest industry employed slightly more than one worker for every 1000 cubic metres logged. In the rest of Canada the average ratio is two workers per 1000 cubic metres logged.[21]

British Columbia accounts for some 44 per cent of the total amount of timber logged across Canada annually, and provides about 27 per cent of Canada's jobs in the forest industry.[22] The value of forest products produced in B.C. was $11.2 billion in 1990, which represents approximately one-third of the Canadian total.[23]

Mining and Petroleum Resources

The total value of minerals produced in British Columbia for 1990 was $4 billion. Coal was the single most valuable mineral with sales totalling more than $1 billion. The value of all metal products was $1.6 billion, with copper accounting for more than half that amount.[24] In 1989 the industry employed a total of 26,000 workers – 18,000 in mining and 8,000 in primary metal production.[25]

Close to ten million hectares of Crown land are under claims for minerals, oil, and gas. Approximately 74,000 hectares are directly disturbed by all forms of mining: metal, placer and coal mines, limestone quarries, and sand and gravel pits. Metal and coal mines account for 21,000 hectares of this total.[26] Exploration for minerals and petroleum resources often alters larger areas of land than the extractive activities themselves and requires extensive road networks. These roads remain in place long after the exploration or extractive activities are over.

Tourism and Travel

Tourism provides a major contribution to British Columbia's economy, but that contribution has not yet been calculated in terms of Gross Domestic Product, nor even in terms of the number of direct jobs created by the industry. Indicators of the importance of tourism are restaurant sales of $2 billion in 1989 and accommodation revenues of $674 million.[27]

In 1989, the number of non-resident visitors to British Columbia totalled 7.6 million, or more than twice the province's permanent population.[28] Out of country visitors accounted for 18 per cent of the total and 22.5 per cent of total travel revenues.[29] Research shows that most visitors are attracted to British Columbia by its scenic vistas and wild places.

Adventure tourism, which relies most directly on the wilderness attributes of the province, is a rapidly growing component of the tourism industry.[30]

Parks, Wildlife, and Outdoor Recreation

The spectacular physical features of British Columbia are an important part of our heritage, and they are also an important economic resource. Six million hectares of the province are in parks and reserves.[31] The provincial parks system recorded more than 21 million visits in 1989, including 17.9 million day use visits, 2.3 million overnight use visits, and 326,000 boating use visits.[32] Vancouver Island's Pacific Rim National Park attracts more than half a million visitors annually, and the park's West Coast Trail is travelled by more hikers than the back country of Banff National Park.[33]

The province's economy is also strengthened through money spent by British Columbia outdoor enthusiasts viewing wildlife and by hunters.

Agriculture

In 1989 British Columbia's farmers produced products with a farmgate value of $1.2 billion. The value of processed food shipments was $4 billion.[34] Over the past decade, employment levels in farming have fluctuated between 26,000 and 36,000 workers.[35] An additional 18,000 to 24,000 workers were employed in food and beverage processing.[36]

Approximately 8.5 million hectares of Crown range lands are available to the cattle industry for grazing.[37] Farm holdings cover 2.4 million hectares, although only 571,000 hectares are actually growing farm crops. The Agricultural Land Reserve (ALR) program has classified 4.7 million hectares of land across the province as being suitable for agriculture.[38] This land is not necessarily being farmed at present, and a significant proportion of ALR land is forested.

Fisheries and Aquaculture

At the height of the fishing season there are close to 30,000 full-time and part-time people directly at work in the fish harvesting, fish processing, sportsfishing, and aquaculture sectors in British Columbia.[39]

In 1989 the commercial fishing industry generated 7,300 employee-years of work. This is based on approximately 16,000 active fishermen working an average of 24 weeks in the year. Their catch of more than 300,000 tonnes of fish had a landed value of $529 million with a wholesale value of $1 billion.[40] More than 62 per cent of the total landed value was salmon.[41] Another 5,700 people are employed in the fish processing industry, which accounts for nearly one-quarter of all food manufacturing in British Columbia.[42] Recreational freshwater fishing and salmon sportsfishing also make important contributions to the provincial economy.

The province's complex coastline provides the ideal setting for the farming of fish and shellfish. The aquaculture industry is a major contributor to seafood production in British Columbia, and in 1989 approximately 131 fish farms had sales of $79 million.[43] Shellfish farms earned an additional $4 million. The aquaculture industry in British Columbia generates the equivalent of approximately 1,100 full-time jobs.[44]

THE CHALLENGE

The challenge facing British Columbians is to redesign our future. If we keep on the way we are headed, we very likely will degrade the natural environment and use up its supply of resources. As that happens, we may no longer be able to sustain the rich economy we now enjoy. If we change our ways, we will improve our chances of creating a better, more sustainable future.

The following table presents a partial list of potential benefits we might expect from a sustainable future, compared to conditions that could occur if we do not change our land water use policies.

Instituting change can be a difficult process. We have to begin with the environmental, economic, and social realities as we find them today and then look for realistic ways to reform how we live and work. But it is hard to know where to begin. The many people with a direct interest in British Columbia's natural environment hold widely differing views on what constitutes proper stewardship of the province's lands and waters. There is limited communication among the many agencies, industries, businesses, and organizations operating in the natural environment, and there is no coordinated set of objectives for them to follow. The land and water use picture is clouded by uncertainty and confusion.

To solve these problems and work towards a more harmonious, sustainable future, we need to address a number of key concerns. This chapter discusses two of the most important concerns: the need to develop an ecological way of thinking, and the need to adopt an integrated approach to the stewardship of the lands and waters of British Columbia. The issue of biological diversity is closely linked to both of these concepts.

In planning for sustainable development, we cannot possibly know everything there is to know before making a decision, and dealing with the limits to our knowledge is a major challenge. But the biggest challenge of all is to take that first step towards a new future.

POTENTIAL BENEFITS OF ACHIEVING SUSTAINABLE DEVELOPMENT

	Continuing Existing Policies Could Lead To:	*A Sustainable Future Could Provide:*
Economy	Continued "Boom and Bust" Cycles	More Stable Economy
	Unsustainable Levels of Forest Cutting	Sustainable, "Ecological" Forestry
	More Mill Closures	Smaller But More Secure Milling Sector
	Continued Weak Secondary Manufacturing Sector	Diverse Secondary Manufacturing Sector
	Declining Forest Productivity	Maintenance of Forest Soils and Productivity
	Declining Employment Per Unit of Wood Produced	Growth of Value-Added Industries
	Pollution Leads to Shellfish Harvest Closures	Reduction of Coastal Pollution Levels
	Increased Concentration of Development in Vancouver	Decentralization of Development in B.C.
	Reduced Opportunities for Wilderness Tourism	Managed Access to Protected Wilderness Areas
	Increased Congestion Marine Parks and Facilities	Increased Numbers of Marine Parks and Facilities
	Continued Conversion of Prime Agricultural Land	Diligent Protection of Agricultural Land
	Shrinkage of Agricultural Sector	Support for Sustainable Family Farms
	Continued Overcapitalization of Commercial Fishing Industry	Sustainable Fishing Fleet Size and Technology
	Hidden Subsidies Encourage Urban Sprawl	True Costs of Development Encourage Compact Cities
	Primary Sector Fluctuations Hurt Service Sector	Stable Service Sector Serves More Diverse Economy
Environment	Declining Biodiversity	Respect and Protect All Species
	Continued Loss of Wildlife Habitat	Identify and Protect Habitats
	Reduced Ecosystem Integrity	Sustain Natural Ecosystems
	Continued Filling of Wetlands	Protect or Enhance Wetlands
	Continued Damage to Coastal Zone	Respect Natural Processes in Coastal Planning
	Cutting of All Old-Growth Timber in "Operational Forest"	Protection of Significant Areas of Old Growth
	Flooding of Valleys from Hydroelectric Projects	Conserve Energy to Reduce Growth of Demand
	Excessive Allocation of Streams to Water Users	Implement Ecologically Sound Water Licensing
	Continued "Exploitation Focus" of Resource Allocation	Balance Environmental and Economic Values in Allocation
	Continued Uncertainty About Ground Water Supplies	Undertake Ground Water Monitoring and Protection
	Urban Sprawl Covers Resource and Undeveloped Lands	Compact Communities Replace Sprawl
	Declining Areas of Wilderness	Protect Significant Areas of Wilderness
	Global Warming	Minimize Release of Greenhouse Gasses
	Deteriorating Air Quality	Clean Air in All Areas of the Province
	Overgrazing of the Grassland Range	Long Term Maintenance of Grasslands

	Continuing Existing Policies Could Lead To:	*A Sustainable Future Could Provide:*
Society	Increasing Conflict Over Resource Access Increasing Conflict Over Resource Management Continued Failure to Resolve Aboriginal Land Issues Concentration of Industrial Power in Fewer Hands Continuing Instability of Resource Towns Growing Rifts Between "Environmentalists" and Extractive Resource Users Increasing Mistrust Among Interest Groups Separation Between Decision-Makers and Public Continued Health Risks in Cities and Resource Towns Continued Erratic Enforcement of Environmental Regulations Growing Reliance on Cars and Highways	Planning Process Recognizes All Resource Values Sustainability Implemented as Basis of Management Negotiation Leads to Agreement on Aboriginal Issues Decentralized Access to and Processing of Resources Diversification, Stabilization of Resource Towns Sustainable Development Reconciles Environment and Economy Land and Water Use Strategy Provides a Basis for Communication and Consensus Integration and Power Sharing Between Government, Industry, and the Public Healthy Cities Program" Effective Province-Wide Full Compliance with All Laws Land Use Planning and Transit Limit Need for Cars

Ecological Thinking

Science and government have traditionally divided the complex natural world into smaller fields of knowledge such as forestry, fisheries, agronomy, soils, and hydrology. But managing the natural world based on any of these sub-fields alone does not take the full ecosystem into account, and can lead to the unsustainable use of natural resources and to the destruction of habitats. Ecological science teaches us that land and water need to be managed on an ecosystem basis. This approach recognizes that plants and animals -- including people -- do not exist alone, but depend on ecological relationships with land, water, air, and other organisms. For sustainable development to become a reality in British Columbia, we will need to allocate and manage the use of land and water on the basis of ecological as well as economic principles.

Biological Diversity and Old-Growth

Ecosystems thrive over the long term if they contain a great variety of lifeforms, and if populations contain a variety of genetic material. This is a kind of biological insurance policy. If an ecosystem experiences a change in climate, or is afflicted by a new pest or disease, chances are that some of the lifeforms in the biologically diverse system contain the right kind of genes to cope with the new conditions. They survive and reproduce and the ecosystem continues. However, as biological diversity decreases in an ecosystem, it is less capable of withstanding any severe environmental shocks.

Both the scientific community and the public have come to recognize the importance of protecting the biological diversity of the province. This is accomplished not only through saving individual species, but by setting aside whole ecosystems that can function without human interference. Biological diversity is severely reduced by the clearing of forests for agriculture, by the draining and filling of wetlands, by urban sprawl, and by pollution of lakes, bays, and estuaries.

British Columbia's old growth coastal forests are celebrated for their towering ancient trees, notably Sitka spruce, Douglas fir, and western red cedar. The same forests also provide habitat for grizzly bears, Roosevelt elk, bald eagles, and a variety of other wild creatures. The coastal forests contain some of the highest volumes of wood per hectare of any forests on Earth, which makes their industrial use extremely valuable to the province. As these uneven-aged, multi-layered forests are clearcut and reforested with even-aged new growth, there are concerns that wildlife habitat will be reduced and that the forest ecosystem will suffer a considerable loss of biological diversity. That is, the simplified ecosystems of the new tree plantations will contain fewer species of lifeforms than the old growth, and these new lifeforms will be less genetically diverse. The same concerns over the potential loss of biological diversity apply to the industrial forest landscape and grasslands of the interior and northern regions of the province.

Towards Greater Integration

Legislation and institutions that govern most land and water planning and management in British Columbia are products of the goals and values of society during the 19th and first half of the 20th centuries. They served the province by opening up the wilderness, creating jobs, and developing the economy. But where corporate profitability, jobs, and government tax revenues were once the overriding factors in resource management, today the public has raised a number of new concerns that include:

- Maintaining biological diversity;
- Maintaining economic diversity and stability;
- Understanding the carrying capacity of ecosystems, and adjusting development strategies accordingly;
- Minimizing negative economic, social, and environmental impacts of development projects; and
- Finding better ways of involving the public in the decision making process.

Land and water legislation in British Columbia mainly covers resource development such as forestry, mining, and energy. There is very little legislation that deals directly with conservation issues such as biological diversity, wilderness, and wildlife habitats. Similarly, there is no single government agency that looks at the "big picture" of land and water allocation and management. These issues are addressed separately by a variety of agencies with different interests and levels of authority.

In particular, some of the present land management agencies in British Columbia, such as the Ministry of Environment, consider questions of biological diversity in their overall planning process, but maintaining intact natural ecosystems is not the express mandate of any agency.

New legislation and institutions are required to deal directly with the challenge of managing for biological diversity and similarly important environmental concerns. Such institutions could be responsible for implementing the principles of sustainability within an integrated resource management framework.

The Limits of Knowledge

The concepts and approaches to attaining sustainability are new, and the kind and quality of information needed to sustainably manage land and water are not clearly defined or understood. In addition, science does not understand the functioning of complex ecosystems such as watersheds, old-growth forests, lakes, or estuaries. Similarly, information on sustainable social or economic systems is limited. The gaps in knowledge and information need to be filled through active programs of research.

Limited data on ecological and social systems is compounded by uncertainty. Unexpected events such as storms, pest outbreaks, or fires limit the ability to predict the response of even simple natural systems. Social uncertainty results from economic fluctuations, changing public values, technological change, and population growth. Planning for sustainable development needs to take account of this uncertainty by keeping plans flexible.

But the lack of information need not prevent progress toward a sustainable future. Choices about pursuing a sustainable development strategy can be based more on human values than on facts. For example, better data might tell us how much old-growth forest is left, but this inventory will not tell us how much, if any, should be preserved. Complete knowledge is unattainable, and the urgency of land and water issues means that decisions will need to be made despite uncertainty. Defining sustainability goals and moving toward a sustainable development strategy need not await further research -- it can begin today.

Environmental Accounting [45]

The natural environment of British Columbia has a value to British Columbians that cannot be measured in dollars. But from a strictly accounting perspective, natural resources such as old-growth forests and mineral deposits are not considered to be of value until they are developed. Once timber is logged or ore mined, this resource development appears as an economic benefit to the province. The more rapid the development, the brighter the economic picture.

But no provincial accounting procedure records the depletion of natural resources. There is no balance sheet to indicate how much of the province's inventory of timber and copper ore has been reduced, how much soil has been degraded, or how much fish and wildlife habitat has been destroyed. This reduction in environmental assets is not considered, its value never determined. On the other hand, environmental destruction can be counted as a benefit, as the tens of millions of dollars spent to clean up the Valdez oil spill was deemed to be an asset in Alaska's GDP accounting system. Similarly, any improvements to the resource base, such as reforestation, are not recorded as an asset.

Because the natural environment of British Columbia is one of its prime assets -- ecologically as well as economically -- it is suggested that we account for the full range of values associated with the use of land and water, and integrate these values into the Provincial Accounting System for the sectors of forestry, mining and petroleum, agriculture, tourism, fish, wildlife, and hydro-electricity.

Determining the economic value of undeveloped natural resources will be difficult, especially in the case of mineral and petroleum resources for which underground inventories can only be broadly estimated. Nonetheless, by accounting for the depletion of the provincial inventory of natural resources, as well as measuring the economic gain from natural resource development, the province could develop a more realistic appreciation of the connections between the environment and the economy.

Business Investment Climate

Investment in land and water-based economic development requires secure access to the natural wealth of the environment and relatively stable political and social conditions. Today, most of the province's lands and waters already have been allocated for economic development, but the business community is concerned that its secure access to the province's natural resources could diminish as a result of aboriginal land claims and increasing public demands for more parks, wilderness, and other protected areas. This climate of uncertainty inhibits the making of new investments.

As we make the transition to a sustainable future, this unstable investment climate will continue until the province establishes a new set of economic and social guidelines. Clearly, this period of transition should be as short as possible. Based on the principles of sustainable development, the new economy will re-establish secure conditions for business investment that includes long-term protection of the environment. The involvement of the business community is critical to the success of a sustainable land and water use strategy for British Columbia.

Population And The Two Economies - Urban and Rural

The world's current population of 5.2 billion people has doubled since 1950, and could double again over the next three decades.[46] The environmental, social, and economic implications of such an increase stagger the imagination, raising the real concern that the world's biological and physical systems may not be able to support such massive numbers of people. Moreover, the fundamental life support systems of land, water, and air may become strained to the point of collapse.

In this global context, Canada occupies a favoured position. It has a rich environment with an abundance of natural resources, and a relatively small population drawing on those resources. This is particularly the case for British Columbia, where the total population of 3.1 million (1990) is less than that of Toronto or Sydney, Australia.

The best available estimate suggests that by 2016 the number of people living in British Columbia could increase by more than 50 per cent to 4.7 million, or even more[47] Most of this projected increase is expected to occur in the metropolitan areas of the Lower Mainland and Vancouver Island. The Lower Mainland and southern Vancouver Island already account for roughly 75 per cent of the population of British Columbia, and they are wrestling with a variety of growth-related environmental and social concerns. These include air and water pollution, waste disposal, traffic, and urban sprawl.

Employment in these regions is centred in the service industries, and it is argued that these densely urban areas already are experiencing post industrial economies. In the future these urban areas may be hard-pressed to provide adequate housing and reasonable job opportunities for significantly larger numbers of people.

On the other hand, rural British Columbia is characterized by resource-based single industry towns with small populations. In recent years some of these communities have even experienced a net decline in population, leading to instability and a loss of commercial and social services. Their futures are tied to fluctuating international resource markets and to the availability of extractable resources. These communities could benefit economically and in terms of social stability if they could find ways to diversify their local economies.

As the total population of British Columbia continues to grow -- along with an increased global demand for its natural resources -- the province's biological and physical systems could be stretched to the limit of their carrying capacity. This in turn could result in a severe economic decline.

A logical response to this unsettling possibility is to safeguard the natural environment -- and the economy it supports -- by rapidly implementing a strategy for sustainable development. This prescription is as true for British Columbia as it is for the rest of the world.

Any sustainable development strategy proposed for British Columbia will have to take into account the significant differences in populations and economies of the province's urban and rural areas. Moreover, as long as the resource-based economy of the regions helps to drive the service-based economy of the urban areas, it will be important to maintain the link between the two.

PEOPLE AND THE ENVIRONMENT

First Peoples

When British Columbia joined Canada in 1871, its population was estimated at about 40,000 people. Of these, probably 25,000 were aboriginal, 9,000 were of European descent, and the balance were chiefly Chinese.[48] Today there are approximately 81,000 status Indians among British Columbia's ethnically mixed population of 3.1 million.[49]

At the time of Confederation the provincial government viewed the lands and waters of British Columbia as a wild and untamed world that was ripe for resource development. For the aboriginal people, the so-called uncharted wilderness was home. The abundant resources of the ocean, rivers, forests, grasslands, and mountains had sustained them in large numbers for thousands of years. Each fish stream, each berry bush, virtually every blade of grass "belonged" to the various chiefs who in turn allocated them to the people of the village.

Because of its long history of human habitation, the British Columbia landscape contains a wealth of historical and archaeological treasures. Some are in full view, such as the bold lines of some petroglyph drawings. Other artifacts from the past are hidden away in remote caves. Certain lands and waters continue to be of special cultural and spiritual significance to British Columbia's aboriginal people.

In the late 1800s and early 1900s the federal and provincial governments systematically took possession of all the lands and waters of British Columbia, assigning the aboriginal people to some 1,650 widely scattered reserves. The moral and legal issues generated at that time persist today, as the aboriginal people of British Columbia contend that they never willingly relinquished their title over the province's lands and waters.

Currently, the federal government has accepted for negotiation 19 comprehensive land claims filed by British Columbia's aboriginal peoples.[50] The resolution of these claims, which cover approximately two-thirds of the province, could have a major impact on how the resources in these areas are allocated and managed in the future. But regardless of who exercises authority over the province's land and waters, the issues of sustainable development remain.

The "Endless Supply"

Throughout the first half of the 20th Century the wild, unregulated lands and waters of British Columbia were allocated to European settlers, farmers, fishermen, loggers, miners, ranchers, and other pioneers of the land and water. Many believed that the land and water were in endless supply, until finally most of the province was allocated for development.

Although much of British Columbia's lands and waters were slated to be developed, until quite recently it was generally believed that the province's physical landscape was so massive that large parts of it would always remain in at least a semi-wilderness condition. Today, all that has changed. The public now recognizes that sooner or later, development will affect nearly all areas of the province.

Reallocation and Wilderness

The realization that most accessible parts of the province are destined to be affected by development has prompted a number of initiatives to protect wilderness. Areas such as Clayoquot Sound, the Kitlope drainage, the South Chilcotin, and the Tatshenshini River are proposed for preservation, partly for the intrinsic wilderness qualities of their ecosystems, and partly because they are considered to be some of the best examples of what remains of British Columbia's wild lands, waters, and wildlife habitat. There is also an economic element to wilderness preservation, as growing numbers of outdoor enthusiasts from British Columbia and around the world enjoy new kinds of wilderness-oriented recreational activities.

To meet the growing public demand to establish more wilderness areas in the province, the government would have to reallocate certain areas from resource-use to some form of park or wilderness designation. This could have a considerable impact on existing land users, especially the forest industry and the rural economies it helps to support.

In 1990 Simon Fraser University studied the economic effects on the forest industry if the proportion of British Columbia's wilderness lands rose from the present six per cent to 13 per cent, as has been proposed by the Valhalla Wilderness Society.[51] The study estimated that such a reallocation could reduce the rate of logging in British Columbia by four per cent and result in a direct loss of 2,600 forest industry jobs. It has been suggested that improved silviculture, better timber utilization by mills, and more value-added processing of wood products could probably create at least this many jobs. The impacts of the wilderness proposal on non-forest industries were not evaluated by this study.

The study's findings have been challenged in some circles, but it is the first of its kind to try to evaluate the impact on the environment, the economy, and society of a proposed major change in land allocation in the province. As we move towards a new vision of sustainable land and water use in British Columbia, we will need a wide range of studies that challenge conventional and partial views to help us select between various options in the future.

Resilience and Recovery

Nature has a remarkable ability to repair damage to land and water over time. In the moist, mild climate of the British Columbia coast, landslide scars may revegetate and damaged streams recover in only a few years. For example, despite being severely affected by the logging methods of the last century, today many coastal streams support sizeable fish runs and their valleys are growing healthy new forests. Just as nature can heal itself relatively quickly, there are other examples of scarred landscapes or degraded stream habitats with little hope of recovery for many decades. The resilience of nature should never be used to justify environmental degradation in the expectation that the damage might be temporary.

ALLOCATING THE LAND AND WATER

To achieve the goals of sustainable development, any process of allocating land and water should support the overall goal of long-term economic productivity, and it should preserve the ability of these natural systems to sustain life. This section describes the major land and water allocation issues facing the province today. The Round Table would appreciate hearing your views on these and other similar issues.

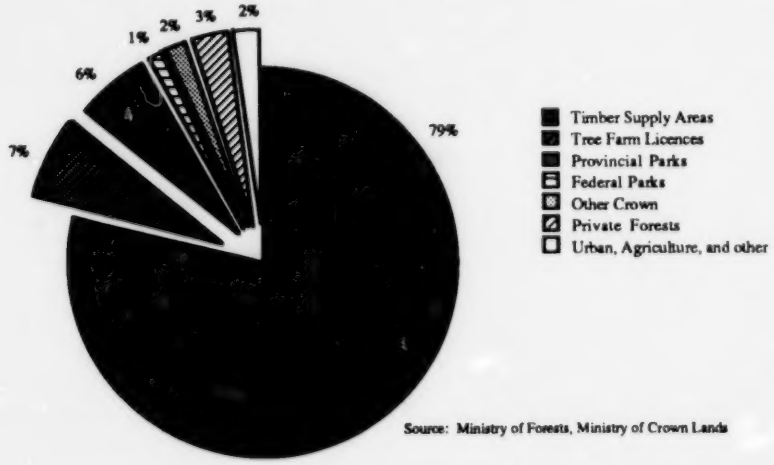
Land Allocation

Land Tenures. Land has long been considered a commodity, something to be bought and sold and something that can be used to produce wealth.[52] But beyond its value as real estate, land has an intrinsic ecological value.

In British Columbia, most of the province's forestry, mining and recreation activities occur on Crown lands, which covers 92 per cent of the province. [53] Most farm production and urban development operates on private lands. Private land allocation operates through the open market, and its use is often determined by zoning or similar land use controls. On Crown land, the government historically has issued long term tenures or licenses to grant private access to extract resources from public lands. Tenures have been granted to individuals or companies to control competition; to promote management, stability, and investment in resource development; to generate employment; and to increase government revenues.

Many land resource tenures were assigned decades ago to allow for the extraction of a single resource. In particular, many large forest tenures (including Tree Farm Licenses) were issued in the 1950s, based on timber inventory data from the 1920s and 1930s.[54] The public was not directly involved in the allocation of these tenures. These forest lands, and others granted around the turn of the century, figure prominently in resource-use conflicts today because public values about the use of these lands have changed. The resolution of these conflicts, such as the reallocation of half of Carmanah Valley to form a provincial park, sometimes requires the intervention of Cabinet.

Land Use Allocation in B.C. (1984)



Source: Ministry of Forests, Ministry of Crown Lands

Agricultural Land. Less than five per cent of the province's land area has the soil and climatic requirements for agriculture, and much of the most productive land lies in valley bottoms where communities, highways, and drainages compete for space. How we allocate this scarce agricultural land can affect food security as well as economic activity. The Agricultural Land Reserve (ALR) is intended to prevent the conversion of high quality agricultural lands to other uses.[55] Recent amendments that permit golf courses to be constructed on ALR land have led to public concerns about the ability of the ALR to achieve its goals. The issue of protecting agricultural land is based on the competition for land for other uses, and the conflict of private property rights versus allocating land for long-term social benefit.

Roads and Utilities. Significant areas of land have been allocated to highways, roads, pipelines, reservoir impoundments, and electricity transmission corridors.

ROADS AND UTILITIES

Type	Length (km)	Area (ha)
Municipal Roads	20,000	41,000
Provincial Highways	42,000	168,000
Ministry of Forests Roads	33,000	33,000
Licensee and Non-Status Forest Roads[56]	90,000	90,000
B.C. Hydro Transmission Lines[57]	17,000	67,000
Pipelines	6,000	9,000
Gas and Oil Access Well Roads[58]	65,000	33,000
Seismic Lines[59]	56,000	39,000
Other Roads Permitted by Provincial Agencies[60]	9,000	11,000
Hydroelectric and Water Supply Reservoirs[61]	-	208,000
Railway Main Lines[62]	6,000	16,000
Total	**344,000**	**715,000**

Sources: Ministry of Crown Lanas, 1989. British Columbia Land Statistics. Statistics and personal comments from Ministry of Transportation and Highways, Ministry of Crown Lands, Ministry of Energy, Mines, and Petroleum Resources, Ministry of Environment and Ministry of Forests.

Road and utility corridors have several important effects on sustainable development decisions. The roads are vital commercial links between communities, and facilitate resource extraction. Road building and maintenance provide local employment opportunities, which can be significant in rural communities. The damaging impacts of roads on communities, streams, and wildlife can also be substantial. Assessments of environmental and social impacts of roads and energy transmission facilities have improved in recent years, allowing some impacts to be avoided or reduced. Linear developments -- especially roads -- tend to concentrate in valley bottoms and flat lands where potential land use conflicts are greatest because these lands are valuable for wildlife, urban development, agriculture, and other activities. In wilderness areas, roads open up land for recreational use. If unmanaged, the impacts of increased human use can be especially harmful to wildlife.

Energy corridors have several effects on land and water. Transmission lines and their cleared rights-of-way can be visible from great distances, affecting the aesthetics of wilderness or residential areas. Electric and magnetic fields (EMF) that surround power lines (and some home appliances) have recently been linked to chronic health problems.[63] B. C. Hydro has reduced its use of herbicides for vegetation control, but still needs to manage vegetation on its rights-of-way for public safety and security reasons.

Urban Sprawl. The expansion of suburbs leads to the reallocation of agricultural, foreshore, and forest lands to urban uses. For example, Environment Canada studies show that in the Lower Mainland more than 600 hectares per year of rural lands are converted to urban uses. Urban sprawl is an inefficient use of land and diverts capital for roads, parks, schools, and other services from city centres to their margins. Long commutes, pressure on farmlands, and unattractive urban forms also characterize sprawl. Increased areas of pavement can effect the hydrology of ground and surface waters. Water quality and fisheries are both threatened by pollution in urban runoff.

Water Allocation.

Land, air, and water together are the inseparable components of all ecosystems, but when it comes to allocation, they are treated as separate entities. Water is allocated by the Water Management Branch of the Ministry of Environment, while other land-based resources are allocated by different agencies. The federal government retains control of navigation, marine fisheries, federal, and aboriginal lands, and international and interprovincial water transfers. This lack of overall integration has created conflicts and can lead to unsustainable resource use.

Once the province issues a water license, it remains in effect virtually in perpetuity. Licenses are issued only for human uses of water, such as domestic consumption, irrigation, mining, and generating hydroelectric power. The Water Act does not adequately protect "in-stream" values, such as fish, wildlife, and aesthetics. There are more than 40,000 water licenses in British Columbia, so any substantial changes that might be made to the water rights allocation system for environmental reasons could be difficult to implement.[64]

Bulk export of water from British Columbia has been resisted, but the market demand for British Columbia's water can be expected to grow in the future. The provincial government has approved seven licences for bulk water export, and is now reviewing many more applications for licences to export water from coastal rivers.[65] Each pending application is subject to preparation of an environmental impact prospectus and interagency review. Bulk export of groundwater from wells is unregulated.

- Should the public be more involved in formulating policy on bulk exports of water?

The extraction of groundwater is not regulated at all, nor is groundwater quality systematically monitored. Little is known about the quantities of groundwater being used for irrigation, domestic, or industrial use. The potential shortage of groundwater is a serious concern in several British Columbia communities.

- Should the province regulate the use of groundwater?

Groundwater contamination is a growing but largely unnoticed issue. Contamination can occur from industrial and agricultural sources, leachates from landfill sites, and acid drainage from mines and other disturbed areas.

Hydroelectricity has contributed significantly to economic development in British Columbia. From domestic heat and light to industrial processing and export of energy, hydroelectricity has created jobs, supported provincial programs, and improved the quality of life of British Columbians.

Many industries in British Columbia were established to take advantage of easily available, low-cost water and power. If constraints were to be placed on licensing of water, it would likely affect the kinds and numbers of industries that can continue to operate here.

Hydroelectric projects block and divert rivers, flood the land behind dams, and change the character of streams above and below dams. Dams significantly affect forest land, fisheries, farmland, wildlife, recreation, and wild rivers. Major hydroelectric projects are reviewed by the British Columbia Utilities Commission (BCUC), which is an appointed body, but independent of the provincial government. Public involvement has become a central element of energy project reviews, although some projects have recently been criticized for avoiding full public review.

MANAGING THE LAND AND WATER

Land and water use involves not only *who* receives a resource allocation, but *how* the resources are managed. The amount of land and water required for a given level of production is, in part, determined by how the resources are managed. Just as land and water allocations in British Columbia typically focus on extracting a single resource such as trees or minerals, management of land and water usually emphasizes a single use. Today the province's resource managers face the dual challenge of integrating their overlapping management systems and making them more consistent with the principles of sustainable development.

For all marketable resources, pricing is a critical component of management. In general, high prices encourage conservation. This rule holds for land, water, energy, labour, and timber.

Prices often fail to include what economists call "externalities," which are costs that are not borne by a producer. For instance, an industrial plant may be able to lower its costs by not installing pollution control equipment, but the external costs of pollution damage to the environment or to other industries are not reflected in resulting prices. These pollution externalities are often paid for by the taxpayer, or accumulate as burdens on the environment.

Land Management

The conservation of soil is fundamental to all land management. However, there are few laws or policies in place to protect the province's soil base.

Some land management decisions are regulated by government, and others are independent decisions of the owners or lessees of the land. Crown lands are generally subject to greater management control than are private lands, although zoning and subdivision regulations strictly regulate the use of land in communities. Monitoring and enforcement are critical to the successful application of management regulations. Without effective monitoring good land management relies on the cooperation of resource users.

The ability of the provincial government agencies to effectively manage all facets of land and water use - from allocation to monitoring - is often limited by staff size and budgets.

Forest Management. A number of resource agencies share land management responsibilities in British Columbia. The Ministry of Forest's mandate covers virtually all Crown land, making it the major land management agency in the province. When it is considering a land management decision such as a logging plan, other resource agencies (Ministry of Environment, Ministry of Crown Lands, etc.) are given the opportunity to comment through various referral processes. Occasions for public input are provided at several stages in the process. The comments of other agencies and the public are taken under consideration, but the final decision is made by the Ministry of Forests.

- Is there a better way of allowing all agencies and the public with interests in provincial forests to have an equal voice in decisions?

The Ministry of Forests Act establishes four objectives of forest management in British Columbia:

- encourage maximum productivity of forest and range resources;
- manage, protect, and conserve forest and range resources for economic and social benefits to the province;
- conduct integrated resource management in consultation with other ministries; and
- encourage a vigorous, efficient, and world competitive timber processing industry in the Province.[66]

The primary objective of the Ministry appears to be timber harvesting.

- Do these objectives reflect the appropriate balance of forest values in British Columbia?
- Are the four objectives fulfilled?

Since the 1940s the forests of British Columbia have been managed according to the principles of sustained yield, namely to provide a perpetual supply of timber for industrial use.[67] In current forest management practices most of British Columbia's old-growth forests are replaced by new stands of commercially desirable trees. These managed forest plantations are designed to supply a sustained yield of wood.

The concept of sustained yield for timber is different from the broader concept of sustainable development, which includes all values associated with an ecosystem.

Most old-growth forests contain much higher volumes of wood per hectare than younger, smaller trees in second-growth forests. The Long Run Sustained Yield (LRSY) of wood fibre from managed forests are estimated to be lower than the present yield from logging old-growth. This gap between LRSY and the present cut is the *falldown* effect.[68] Timber supplies already are reduced in some regions causing a loss of jobs due to mill closures and cutbacks.

The rate of logging on Crown land, the Annual Allowable Cut (AAC), is set by the Chief Forester. In setting AACs, the Chief Forester considers the rate of forest growth, the timber requirements of mills, and the economic and social goals of a region.[69] The AAC is a combination of policy and technical analysis.

The AAC on Crown forest land stands at approximately 75 million cubic metres per year.[70] It has been questioned whether sustaining this rate of cut over the long term is possible or desirable. Some members of the public are asking that the Forest service begin reducing the AAC today. The forest industry is seeking an increase in the AAC, along with an increase in the rate of reforestation. In recent years, the annual cut on both Crown and private lands has ranged from 78 to 92 million cubic metres.[71]

A number of alternatives to present forest management policies have been suggested. For example, community management of local forests could allow a town or region to plan for its own resource-based sustainable future based on a range of activities including wilderness tourism, low-impact logging, and fishing. On productive second growth stands, intensive forest management (thinning, pruning, fertilization) could increase forest employment and could reduce the rate of logging old growth.

The issue of clearcut logging highlights the conflicts over forest management. Proponents of clearcutting claim it encourages rapid forest regeneration, reduces hazards to workers, and allows for the efficient extraction of timber. Opponents claim clearcutting is ecologically damaging, reduces biological diversity, and disfigures the landscape. A sustainable development strategy must be able to address contentious issues like clearcutting and arrive at acceptable decisions.

Agricultural Management. Management is critical to attaining sustainability in agriculture. Maintaining soil quality, for example, is necessary for the future growth of food and forage crops. Careful use of agricultural chemicals may improve productivity without damaging soils or the quality of surface or ground water. Crop selection, production methods, and marketing can determine the economic sustainability of agriculture.

Organic farming, also called low-input sustainable agriculture (LISA), addresses many of the problems of conventional agricultural management. LISA farming limits or eliminates the use of chemical pesticides and fertilizers, and uses other farming techniques such as minimum tillage to reduce soil degradation. Compared to conventional farming, LISA requires much greater understanding of ecology than conventional farming, and more intensive management of crops, soils, and pests. Organic produce, however, sells for high prices and can generate good returns for LISA practitioners, and the demand for organic produce is growing.

Some agricultural sustainability issues cannot be influenced by individual farmers or ranchers. For instance, international economic conditions can affect the viability of even efficient farms and ranches. In the Okanagan, fruit growers claim that they cannot compete with American growers and therefore should be allowed to convert their land to non-agricultural uses. Such changes in land use, however, would have long-term implications for food security in the province.

Many British Columbia farm operations are much smaller than their American counterparts, and their costs of production are higher. Marketing boards, which were designed to support small farms in British Columbia, maintain high prices and control competition in designated sectors (dairy, poultry, eggs).

Grazing, too, raises issues of sustainable management. Overgrazing can cause serious erosion. The method of allocating grazing leases and the relationship between forestry and grazing are sometimes subjects of controversy. Livestock and wildlife conflicts focus on competition for forage and the perceived need for predator control.

The expansion of urban communities onto natural resource lands sometimes results in changes in resource management. Farming on the urban fringe can feature intensive production of high-value crops, and has been successful in maintaining profitable agriculture close to cities. In the case of forestry, the aesthetic impacts of logging within cities' viewsheds can be reduced by careful forestry practices.

Water Management

Presently there is inadequate information to determine long-term water quality trends in British Columbia. Pollution problems commonly exist near urbanized or industrial areas where analyses of fish provide evidence of significant pollution. The effects of industrial and municipal discharges on the health of fish and wildlife and the productivity of estuaries is a growing concern.

In undeveloped areas of British Columbia, erosion and landslides can reduce water quality. Road building and clearcut logging have been associated with landslides and damage to property and water quality.

Fish-forestry guidelines have been adopted recently by the Ministry of Forests to aid in planning for the protection of fish-bearing streams in coastal British Columbia. The regulation of water quality in streams without fish is still limited, and guidelines are less powerful than laws.

Pollution Control. Water is not only used for consumption, it is also used to dispose of wastes. Communities in the interior of the province generally have secondary or tertiary sewage treatment systems. Coastal cities discharge large volumes of sewage into marine waters. Storm runoff from roads, homes, and agricultural operations carries oil, chemicals, and soil into bodies of fresh and salt water.

Sustainable water management requires that pollution be effectively controlled. Such control requires that *point sources* of pollution, such as mills, factories, and sewage treatment plants, be regularly monitored.

The province has been working to implement a cost-effective and reliable monitoring program. Without reliable monitoring, compliance with pollution regulations is difficult to enforce.

The Ministry of Environment has developed water quality standards for 12 contaminants, and has established water quality objectives for 24 bodies of surface water, including both fresh and salt water areas. Although the objectives do not constitute enforceable laws, they identify the quality of water that is safe to use for designated purposes such as drinking, irrigation, recreation, fish, wildlife, or industrial use.[72]

A number of recommendations have been suggested to improve the quality of water management in British Columbia. These include the application of province-wide regulations, more rigorous control standards, and more effective enforcement of current regulations.

Watershed management. Guidelines (not regulations) for forestry, agriculture, grazing, and recreation in community water supply watersheds were produced in 1980 by an interagency task force.[73] However, conflicts over appropriate watershed use and management still persist. For example, municipalities often lack the legal ability to control the use of the Crown land in the watersheds that provide community water. To date the Ministry of Environment has undertaken integrated watershed planning for four communities, but these plans are not legally binding. Many more watersheds likely need integrated management plans and the authority to implement the plans.

Marine waters. For the marine environment, water management is not governed by any comprehensive water quality legislation, although some federal and some provincial standards apply in certain situations. For example, if fish or marine mammals could be harmed by a marine or fresh water pollutant, action can be taken against the polluter under federal legislation. But this lack of comprehensive legislation and integrated management are major impediments to protecting the marine environment.

Special Management Areas

Some landscapes, such as wetlands and the coastal zone, are a combination of land and water ecosystems. Managing these interconnected ecosystems poses a unique set of challenges. Fisheries, too, require management of both land and water.

Wetlands. Wetlands are low-lying areas that include estuaries, bogs, marshes, wet meadows, sloughs, potholes, swamps, and wet edges of lakes, streams, and rivers. Wetlands play a critical role in the hydrologic cycle, because they store and purify runoff and regulate the flow of streams.

Interior and coastal wetlands have high biological productivity and are important to waterfowl and fisheries. They also have the capability for supporting agriculture, other wildlife, and recreation. Coastal and estuarine wetlands in British Columbia are in short supply, but parts of the interior have large areas of freshwater wetlands.

Burns Bog in Delta is a splendid wetland that has been used for an industrial park, roads, homes, a source of peat, and a dump for the Greater Vancouver Regional District. As a result, its ability to support wildlife and control the flow and quality of water has been reduced. In many other parts of the province, such as the South Okanagan, wetlands are commonly drained for agriculture.

The conservation of wetlands is an important goal of any sustainable development strategy for the province.

The Coastal Zone. The ocean meets the land in the coastal zone, which is a dynamic physical environment. Estuaries are especially rich ecosystems, producing a myriad of lifeforms. Mudflats and beaches provide important stopover areas for migratory birds, and near-shore areas are prime shellfish habitat. This highly productive region is also greatly valued for housing, recreation, and industry.

Federal, provincial, regional, and municipal governments all have some authority over the coastal zone, but they only have a limited ability to control development, regulate polluting activities, and respond to unpredictable acts of nature. The traditionally high demand for coastal resources can be expected to increase as the province's population and economy expand. The public is asking for integrated coastal management plans that would foster the sustainable management of the coastal zone's varied resources.

Fish Habitat. Fish require clean water and adequate habitats for spawning and feeding. Draining and filling wetlands, damming rivers, log booming, and diverting creeks are major causes of habitat destruction. Fish can be harmed by changes in water quality resulting from urban development, sewage, agriculture, logging practices, road building, mining, and natural events. Industrial and municipal pollutants have led to the closure of many productive areas for shellfish harvesting.

Preserving runs of wild fish is important to both the commercial and sport fishing industries, and helps to maintain biological diversity. Wild fish require high quality natural spawning and rearing habitats. Protecting the quality of fish habitat results in a high quality of water that in turn enriches our quality of life.

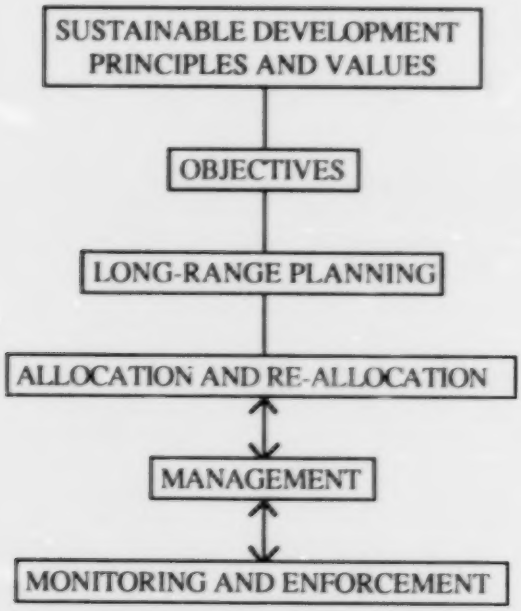
The federally funded Salmonid Enhancement Program and other similar programs have rehabilitated many stream habitats in British Columbia and have constructed hatcheries to improve fish production in seriously degraded streams. Both wild and hatchery fish production have benefitted by the program.

Controversy persists in the province over the relative value of fish produced in hatcheries, in fish farms, and in the wild. The issues involve economics, lifestyle choices, genetic diversity, and environmental protection.

A STRATEGY FOR ATTAINING SUSTAINABLE LAND AND WATER USE

British Columbia needs a clear strategy for attaining a sustainable economy that will not diminish the richness of the environment. The purpose of this chapter is to describe the elements that could be included in creating a strategy for sustainable land and water use. The Round Table seeks advice from the public on all aspects of the strategy.

ELEMENTS OF A SUSTAINABLE LAND AND WATER USE STRATEGY



Principles for Sustainable Development. The Round Table has already suggested a set of principles that could form the basis of a sustainable development strategy (see Introduction). These principles include a range of values associated with land and water use. Once they are accepted, these principles and values need to be applied in a manner that balances economic and environmental concerns.

- How could the Round Table's sustainability principles be improved?

Objectives to Attain the Goals. The principles of sustainability need to be translated into objectives and policies. These objectives could address such issues as analyzing the value of resources, integrating the way land and water is allocated, and developing techniques for managing land and water that are consistent with the principles of sustainable development. Some important questions might include:

- How can the array of environmental values be adequately reflected in the decision-making process?

- What management priorities and objectives should be established in accordance with sustainable development principles? How can these objectives be adopted at various levels of government?

- How should biological diversity be maintained at the provincial and regional levels?

Long Range Planning. A wide range of approaches to planning are available for achieving sustainable land and water use. One approach could be to develop a hierarchy of plans, ranging from the provincial to local levels. Local or community plans could be the most specific, designating actual uses of land and water based on locally-determined goals. Resource Management Committees and/or Local Round Tables have been suggested as the kinds of bodies needed to coordinate these local plans.

- What planning methods should be used to govern the process of allocating land and water?

- What other approaches to planning could be used to achieve sustainable land and water use?

Allocation of Land and Water. Allocation determines what kinds of uses are appropriate on the land and water, and who gets access to the benefits from these areas. A final product of the allocation will be a map that designates lands and waters for appropriate uses. Any efforts to institute a sustainable land and water use strategy probably would require changes to the existing allocations.

- Should every development in British Columbia satisfy all of the goals of sustainability? Or could some areas be allocated for development that causes environmental harm (such as cities and industrial areas) as long as, on balance, the province protects environmental values?

The following steps would be required in any land allocation strategy, and the public and industry should be involved at every stage.

Collect and process baseline environmental information. The full range of environmental values will need to be studied, including timber, fish, water, scenery, tourism opportunities, wildlife habitat, biological diversity, and agriculture. The interaction between these resources will need to be appraised.

- What other information may be required in order to apply the principles of sustainability in land and water decisions?

Determine Capability and Suitability of Land and Water Use. Information on environmental characteristics can be used to assess the capability of land and water to support various uses. The social and economic suitability of potential uses also needs to be determined for each area of land or water. Suitability is based on economic considerations, concerns for ecological protection, and the value society places on various environmental uses such as forestry, fishing, recreation, parks, and agriculture. Including the public and industry in preparing criteria for assessing suitability would be a significant change from existing procedures.

Link Capability and Suitability. The integration of environmental capability and suitability of land and water use is vital. Each area of land and water should have inventory information describing environmental characteristics, a capability rating indicating its ability to sustain a given level of use for its range of resources, and a suitability indicator indicating the best use or mix of uses for the site.

- Who should make broad land and water allocation decisions in the Province, and how should public input be incorporated into this process?

- Should we address the issue of compensation for existing tenure holders who are affected by land and water reallocation?

Management of Land and Water. Management deals with how land or water is used for a designated purpose, and can determine the extent of environmental impact and economic benefit from a use. For example, recreational land could be managed for downhill skiing (requiring substantial environmental change for lifts, cleared runs, parking, and accommodation), cross-country skiing (with narrow paths and overnight huts), or wilderness (with nominal trail marking).

The sustainability of economic activities is largely determined by sound planning and management. Management guidelines for land and water may be based on the following priorities or goals:

- maintaining globally competitive industries;
- having stable communities;
- increasing the numbers of jobs per unit of resource extracted;
- limiting use of pesticides;
- minimizing aesthetic impacts;
- preventing off-site damage;
- reducing energy use;
- maintaining biological diversity and stable ecosystems;
- limiting release of carbon dioxide; or
- minimizing conflict between users of the environment.

The relative importance of these or other management priorities are likely to change over time.

- How can the need for economically competitive industries be balanced against environmentally sound management?

Monitoring and Enforcement

Monitoring. Monitoring is required to determine if allocation and management plans are being properly administered, if environmental values are being maintained, and if resource users are complying with guidelines and regulations.

Monitoring is necessary during major construction activities such as road building and for releases of potentially harmful substances such as effluent from pulp mills or sewage treatment plants, or agricultural runoff. Pollution control requires monitoring of a range of pollutants at a large number of sites. The costs of sampling, testing, and reporting results are very high, and improved methods of cost-effective, reliable monitoring are needed.

- How do we establish priorities for what should be monitored?

Enforcement. Through education and incentives, the need to force parties to comply with laws and regulations can be minimized. If the incentive "carrot" cannot induce compliance with the law, then fair and just use of an enforcement "stick" may be necessary.

Enforcement needs to be fair and complete. Erratic enforcement provides incentives for cheating, and undermines public confidence in government. Setting appropriate standards for pollutants requires the integration of science, engineering, and politics. Because risks can never be completely eliminated, society needs to judge the level of environmental risk that is acceptable.

The impacts of potential job losses resulting from plant closures need to be balanced against the impact of pollution on the environment and on other resource sectors. Public costs of enforcing regulations -- for monitoring and prosecution, cleaning up the environment, and lost revenues from closed plants -- can also be high.

- Who should bear the cost of monitoring, enforcement, and pollution control?

ELEMENTS CRUCIAL TO THE LAND AND WATER USE STRATEGY

Integration in Planning Processes. Land and water use in British Columbia today is not based on the principles of sustainable development, due in part to a lack of integration of environmental, social, and economic considerations. Existing planning and regulatory procedures need to be integrated with a sustainable land and water use strategy by;

- adopting a broad ecological perspective, so that land, water, and biological resources are managed together;
- ensuring that all resource sectors (for example, forestry, mining, fisheries, water resources) and environmental protection have equal weight in decision-making at the government level;
- improving coordination and cooperation among all levels of government, which includes sharing of power and information among federal, provincial, and local governments and the public;
- conducting impact assessment studies or environmental audits before undertaking new uses of the land and water;
- considering aboriginal peoples' concerns and needs; and
- linking community, regional, and provincial goals and strategies (through a hierarchy of plans).

A wide variety of land and water use plans are currently in effect across the Province. In addition, a number of alternative planning systems have been proposed by government agencies, industry and the public. A cross section of existing and proposed planning initiatives are listed in the Appendix.

Plans Are for People: Improving Public Involvement. The top-down plans that once were prepared by government often failed to recognize the important roles the public should play in identifying goals and issues early in the planning process. Today, the need for public involvement is considered vital, but true public participation in decision-making has not been adopted. The public, through their government, owns the Crown lands and waters that produce economic wealth, and needs to be involved, not just consulted, in the sustainable land and water use strategy.

- How and when should the public be involved in the sustainable land and water use strategy?
- How much change in government structure would be necessary to permit effective public input?

Obstacles to Sustainability: Restructuring Laws and Institutions. Provincial and local institutions and laws were developed to serve the land and water allocation and management priorities of the past. Changes to these laws and institutions will be necessary to attain a sustainable future in British Columbia, and discussion of what changes are needed may form an important element in the land and water use strategy. Laws and institutions -- even the structure of our government -- should not be viewed as permanent and unalterable; they were formed by people in response to past needs, and can be changed to suit the needs of the future. It is clear there must be some changes to the method by which land and water are allocated.

- Should there be a super-ministry of government to which all land and water use decisions are referred?

- Should the decisions be made by a Crown Corporation?

- Should an advisory committee make recommendations to government in reference to land and water allocation?

- Are there other options?

One set of suggested changes has come from the Sustainable Development Committee of the Canadian Bar Association. The committee reviewed many of the British Columbia laws that apply to land and water, and recommended improvements to advance the goals of sustainable development. Forestry examples include adding an appeal provision to the Forest Act to permit users of non-timber resources (such as water or wildlife) to appeal Ministry of Forests decisions; elevating the coastal fisheries/forestry guidelines to the status of regulations; and making biological sustainability of forests the primary consideration in forest planning, including the setting of the AAC. In other land and water sectors, the committee suggests adopting legislation to protect groundwater from contamination by pesticides; "whistle-blower" protection for employees who report environmental wrong-doing by employers; and establishing regulations and standards to protect the quality of drinking water in British Columbia.

- How much law reform is acceptable as part of achieving a sustainable future?

- Are flexible guidelines preferable to laws and regulations?

Plan Implementation. A plan is just words and maps, and a strategy is just an approach to achieving goals. The true test of any plan or strategy is the success of its implementation. Many past plans have languished for lack of effective implementation. Full public involvement in the land and water use strategy can give people a stake in the plan's implementation, and improve its chances of success. The following actions are important to successfully implementing sustainable land and water use plans:

Adoption. The first step in implementation is to adopt the plans produced under the land and water use strategy. If a consensus approach to decision-making is adopted in preparing the strategy, then gaining final approval by the stakeholders in the process should be simple.

- Who should be empowered to approve the plans? Cabinet? Local Resource Management Committees?

Appeal Procedures. Parties who are unhappy with decisions made under the land and water use strategy need an avenue of appeal. Such an appeal process may follow the planning hierarchy, by appealing from the local level to the region, then to the province. Alternatively, a separate body could be created specifically to deal with appeals. Whatever technique is used some appeal process is clearly in keeping with the open, public nature of the land and water use strategy.

- Who should be responsible for deciding on appeals and amendments?

Periodic Review and Revision. No plan is permanent, and at regular intervals the land and water use strategy should require that all plans be reviewed and revised. Changing conditions of the environment, economy, and society need to be reflected in living plan documents. New information on sustainable development could also be included in the plans.

- What avenues should be available for the public to participate in implementation of sustainable development plans?

Decisions by Consensus. Land and water use conflicts may be addressed in the following ways. In the *political power* mode, disputing parties use lobbying, public relations campaigns, elections, or appointments to decision-making panels to defeat or outmanoeuvre opponents. *Civil disobedience*, including road blockades, harassment, demonstrations, or illegal strikes, can attract media attention and disrupt access to resources. Through the *authoritative* mode, a higher authority such as a court, government official, designated arbiter, or appeal board can make a unilateral decision. In the *consensus* mode, the parties can reach an accord through collaboration and joint problem solving that is acceptable to all concerned. All four of these methods, and others, are used in British Columbia.

The land and water use strategy needs an equitable, effective, and efficient method of making land and water use decisions. Consensus-based decision making may be a viable approach. Groups involved in consensus decisions must reach an accord. Majority votes or unilateral judgements do not form the basis of decisions.

The Round Table advocates much greater use of consensus decision-making because it offers several advantages over more authoritative approaches. Consensus can foster greater creativity in identifying a range of potential solutions to difficult problems, and the parties can focus on the needs and concerns that are at stake. The approach also leads to greater commitment by the parties to whatever decision is reached; not involving parties in the problem-solving process often leads to indifference or resistance to solutions. Consensus also avoids the need for "winners" and "losers", and can lower the barriers that separate disputing parties.

However, consensus is more difficult when making decisions affecting fundamental values that cannot be compromised. For example, the numbers of wolves to be killed in a control program could be addressed by consensus, but the approach could not develop a compromise between those who advocate wolf control and those who feel it is immoral. Consensus-building also takes time, and may not be appropriate in situations where decisions are urgently required, nor does it avoid the problem of the decisions of one group harming a neighbouring region.

Consensus could be used extensively in the land and water use strategy, from agreeing on goals to setting enforcement standards. A hierarchical planning process might rely on consensus at the local level, in which major interest groups negotiate allocation and management of land in their area. Decisions on plans would not be made by government until the consensus process has been given a fair chance. Only if consensus agreement cannot be reached would issues be passed to regional or provincial levels.

Such decentralized decision-making would require government and tenure holders to relinquish some of their authority to multi-interest consensus groups at the community level. A major issue facing designers of a consensus process is to determine the extent of power-sharing necessary to make consensus processes work.

- How do we identify the stakeholders to be involved in a consensus process? Should it be open to all interests, or be limited in scope? Who should represent the stakeholders and how should these representatives be chosen? How can we ensure that these representatives are accountable for their decisions to both their constituents and the other parties in the process?

- What format should consensus-building take at each level of decision-making?

- How should the process be used by decision-makers? What influence or authority should the results have on final land and resource use decisions?

- How much power should be decentralized as part of a sustainable development strategy?

CONCLUSION

The challenge facing all British Columbians is to build on the strengths of the economy while correcting its flaws, to begin to steer the province in the direction of sustainable development. There is little doubt that we can do it if we try. We have a highly skilled work force, plenty of thoughtful, resourceful people, and a reputation for being innovative and willing to take a chance.

Working together, we can develop a long-term vision of the kind of world we want, including clean water and fresh air, wide open spaces, and a diverse economy that includes sustainable resource-based industries. Then we can create a strategy that will get us there. The strategy might include incentives for innovative businesses, tough pollution control standards, and wildlife and wilderness legislation.

No one has all the answers to how we should design a sustainable future. As this theme paper on land and water use so clearly demonstrates, we are still learning to ask the questions. For example:

- In a sustainable development strategy, who finally decides what the goals will be? Who implements those goals?
- Is there a place in the strategy for people to appeal decisions they believe affect them unfairly?
- As we learn more about land and water ecosystems, how easy will it be to revise the strategy to suit the new information?

Finding the right questions and trying out different answers is the starting point to a process that could carry us into a far different future than the present we know today. The Round Table invites all British Columbians to join in this process, to help design a sustainable development strategy for land and water use in the province that will sustain the environment, the economy, and the quality of life as we enter a new century.

APPENDIX

Kinds of Protected Lands

The meaning of wilderness, parks and recreation areas is interpreted differently by different groups. In British Columbia they are defined as follows.

Wilderness is described by the Ministry of Forests as an area "that predominantly retains its natural character and on which human impact is transitory, minor, and in the long-run substantially unnoticeable."[74] The Ministry of Parks defines the wilderness recreation zone as being at least 5,000 hectares, allowing aircraft access and hunting, and having primitive facilities. The wilderness conservation zone is remote, more than 5,000 hectares, prohibits mechanized access and hunting, and has no facilities.[75] In national parks, wilderness is any "region of a park that exists in a natural state or is capable of returning to a natural state." [76]

- Is human use compatible with wilderness?
- How big (or small) should a wilderness area be?

Parks serve the dual goals of preserving the natural environment and providing for recreational experiences. Municipal, regional, provincial, and federal governments all operate parks, ranging from playfields to large areas of wilderness. Provincial parks are categorized as Class A Parks, in which all commercial resource extraction is excluded; Recreation Areas, a temporary designation that permits mineral exploration (but no logging) pending inclusion of the areas in the park system; and a small area of Class C Parks, which are community parks. There are 4.2 million hectares of Class A Parks, 1 million hectares of Recreation Areas, and 20,000 hectares of Class C Parks. Within Provincial parks, uses are zoned for intensive recreation, wilderness recreation, wilderness conservation, and special features.[77] The Ministry of Forest has designated 111,000 hectares of wilderness within provincial forests.[78] The Canadian Parks Service administers six national parks in British Columbia, consisting of 476,000 hectares.[79]

Ecological Reserves are established by the provincial government to protect examples of representative or important ecosystems, and rare and endangered species, and phenomena. The reserves provide areas for research, preservation of genetic material, benchmark areas for comparison with human modification of the environment, and outdoor classrooms. British Columbia's 129 ecological reserves cover 158,000 hectares (0.1 per cent of the province), and average 1,200 hectares in size (although most are much smaller). Roughly two-thirds of the protected area is land, and one-third water. Public use is discouraged.[80]

In recognition of the need to protect waterfowl and wildlife there are in place a number of wildlife management areas, migratory bird sanctuaries, and national wildlife areas.

Management Terms

A number of terms are incorporated in discussions of land and water management. **Stewardship** implies care and responsibility in the use of land and water, as compared to exploitation, which can lead to unsustainable levels of use. **Preservation** is the setting aside of lands or waters to protect physical and biological features. **Conservation**, like stewardship, keeps resource use within the limits of an ecosystem's capacity to sustain development over the long term. A conservation strategy can include preservation of some areas and resource extraction in others.

A variety of resource management systems have been defined, ranging from **frontier economics**, a human-centred view of nature as an infinite source of wealth to be exploited, to **deep ecology**, which assigns intrinsic value and rights to trees, fish, whales, and the rest of non-human nature. Deep ecology questions economic growth as a goal, and advocates minimizing human interference with natural processes.[81]

Capability is the ability of a parcel of land or body of water to produce a desirable good. The Canada Land Inventory, for example, may designate an area of the Peace River Valley as having high capability for wildlife, high capability for agriculture, and low capability for recreation.

Suitability is the desirability of conducting a use in a designated area, based on social and environmental considerations. For instance, the lawns of the Legislature may have high capability for intensive cultivation, but obviously would be considered unsuitable for farming.

Carrying Capacity can have a very specific meaning, such as the capacity of a given valley to support a certain population of deer. The Round Table uses the term in a much broader sense, to refer to the broad limits within which an ecosystem can continue to function. A given area can sustain activities up to a certain level, but once this level is exceeded, the environment and the activity can be expected to deteriorate. The concept is also applied to human populations.

A Cross-section of Active and Proposed Planning Activities

The following kinds of planning activities are in place in British Columbia, and should be integrated with a sustainable land and water use strategy:

The Agricultural Land Commission reviews zoning and use of land within the Agricultural Land Reserve, with the intent of protecting agricultural capability;

The Aquaculture Review Process is an interagency provincial process that approves or denies applications for fish farms;

Coastal Resources Inventory Studies and Backcountry Recreation Inventory Studies have been coordinated by the Ministry of Crown Lands to integrate commercial opportunities with other land uses;

The Crown Land Disposition Referral Process obtains comments from provincial resource agencies as part of the review of private applications for use of Crown land;

The Energy Project Review Process is required for major electricity transmission lines, pipelines, fuel storage facilities, and energy generation facilities, and is conducted by the B.C. Utilities Commission;

Fisheries Management and Planning is conducted by the Ministry of Environment and Department of Fisheries and Oceans, to manage and enhance the freshwater fishery and to comply with the federal Fisheries Act;

The Floodplain Review Process gives provincial agencies opportunities to comment on plans for development in floodplains;

Forest and range planning is conducted by the Ministry of Forests and deals with short-term and long-term proposals for logging, grazing, recreation, water use, fisheries, wildlife, wilderness, and other uses;

The Fraser River Estuary Management Program is a cooperative Federal - Provincial program which addresses development and environmental protection in the estuary;

The Burrard Inlet Environmental Management program is a proposed intergovernmental program to address water quality and other issues in the Inlet;

The Heritage Resources Impact Assessment Process requires review of all projects that may endanger known or potential historic, archaeological, architectural, or scenic values on public or private lands;

The Major Project Review Process applies to large-scale industrial and marine projects, and calls for comprehensive impact assessments to be reviewed by the Ministry of Regional and Economic Development and Ministry of Environment;

The Mine Development Review Process is intended to identify and reduce impacts of coal and hard rock mines (not placer or quarry operations) under the administration of the Ministry of Energy, Mines, and Petroleum Resources;

Municipalities and regional districts produce official community plans, rural land use bylaws, related regulations that affect the allocation and use of land, and prepare solid, liquid, and biomedical waste plans;

The Ministry of Parks conducts park system and management planning to establish goals and objectives for parks and to obtain Cabinet approval for additions to the park system;

The Waste Discharge Approval Process, administered by the Ministry of Environment, regulates, sets standards, and grants permits for release or disposal of liquid and solid wastes and air pollutants;

Water rights are allocated by the Ministry of Environment to legitimize and control the use of surface water and construction of water works;

Wildlife management and planning of the Ministry of Environment focuses on large mammals and special bird habitats through interagency referrals and establishment of Wildlife Management Areas.

Some additional active and proposed planning initiatives focus more directly on sustainable development:

The **Ministry of Parks, The Ministry of Forests, and The Ministry of Energy, Mines and Petroleum Resources** are now conducting a round of public meetings as part of **Parks and Wilderness for the '90s,** to identify public and private concerns about proposed parks or wilderness areas, to be followed by allocation and management plans for suitable areas;

The **Clayoquot Sound Sustainable Development Steering Committee** was established to formulate a sustainable development strategy for all resource users and communities in the lands and waters of Clayoquot Sound. It succeeds an earlier Task Force established in response to a community request for a sustainable development strategy;

The **Ministry of Crown Lands** in the early 1980s proposed a hierarchical provincial land planning process, from the provincial level through regions, districts, sub-districts down to specific, site-level plans. The plans were to balance private land use rights, the public interest, and ecological considerations;

The **B.C. Forest Resources Commission** in its 1990 **Options Report** called for a land use strategy to deal with conflicting resource uses in the province. Their plan would apply to all forested lands in the province, identify and rank forest values, and link suitable use to these capabilities, with planning to be conducted at both the provincial and regional levels;

The **B.C. Forest Industry Land Use Task Force** outlined a forest-based approach to province-wide planning in **Toward a Land Use Strategy** for British Columbia, published in 1990. The industry report recommends increasing forest production and increasing the AAC, and creating a permanent provincial Land Use Commission that would answer to a Land Use Committee of Cabinet;

The **Association of B.C. Professional Foresters** in 1987 drafted a land use strategy for the province, to reduce uncertainty and costs of present land allocation processes through a provincial zoning system based on physical characteristics. Both provincial and regional plans would be prepared under the administration of the Ministry of Forests;

The inter-ministry **Old Growth Strategy Project** was initiated by the Ministry of Forests in 1990 to develop a working strategy for the management of old-growth forests in British Columbia. Elements of this strategy include the research and inventory of old-growth forests, and the identification and reservation of representative old-growth stands;

The **Dunsmuir Agreement**, prepared by 51 individuals and representatives of government and private groups in 1988, outlines goals of a provincial land use strategy that would address economic, social, cultural, and spiritual needs of British Columbians. It included principles of sustainable development, and called for a data base on resource capabilities, setting of objectives and priorities, and implementation of a Cabinet-approved plan;

Endangered Spaces is a project developed by the Earthlife Canada Foundation and the Canadian Parks and Wilderness Society to complete a system of fully protected natural areas in British Columbia by the year 2000 to protect and sustain biological diversity;

Many communities have already begun to prepare environmentally-oriented plans. The **Greater Vancouver Regional District** has completed the "Choosing Our Future" program that identified actions needed to conserve the environment. The Municipalities of **Matsqui** in the Fraser Valley and **Saanich** on Vancouver Island, for example, have prepared environmental inventories and evaluations. These and similar initiatives can contribute to the preparation of sustainable land and water use plans;

Industry groups are beginning to develop their own codes of practice and procedure for environmental protection and sustainable development. In the Fraser Valley, for example, the agriculture industry and government agencies are preparing a guidelines for the handling of chemical fertilizers and animal wastes. Other sectors, such as the petroleum and mining industries, have also completed codes of environmental practice and procedure.

How Would the Sustainable Development Strategy Work: An Example

To provide an example of how decisions might be made if a sustainable development strategy were implemented in British Columbia, let us assume that a developer proposed to build a fish processing plant in an undeveloped waterfront area of the province. To determine if the proposal is consistent with the principles of sustainable development, we may want to answer the following questions.

Does the proposed fish plant comply with the objectives of sustainable development?

- Will the activity generated by the fish processing plant exceed the carrying capacity of its site and surroundings?
- Will the fish plant create an unsustainable demand for fish?
- Will waste pollute the air, water, or land?
- Will waterfront habitat be threatened?
- Does the plant deplete nonrenewable resources (such as the waterfront)?
- Is there a reasonable economic return to the province? To the community?
- Is the development economically sustainable?
- Will the developer pay the full environmental costs of the plant?
- How many local jobs are created?
- Are opportunities for future generations affected?

Should land and water be allocated for construction and operation of the fish processing plant?

(The overall land and water use strategy could result in preparation of a land capability and suitability assessment for all areas of the province. The fish processing plant proposal could be subjected to a similar process for its siting.)

- Is the proposed site capable of sustaining the plant?
- What other uses is the site capable of sustaining?
- Based on social, economic, and environmental considerations, is the fishing processing plant suitable use for the site?
- Is a fish processing plant the best use of the site?
- How many fish processing plants are needed in the area?
- Would other uses be displaced by this development? Would compensation be necessary?
- Does the plant comply with existing zoning and other regulations?

- What information on the proposed use and on the environment and economy are needed to make allocation decisions?
- If the developer disagrees with the allocation decision, what avenue of appeal is available? Who will make decisions?

Will the plant be managed in a sustainable manner?

- Has an impact assessment been prepared that addresses environmental, social, and economic concerns? What are its findings?
- Can the identified impacts of the plant be avoided or reduced?
- Can unavoidable impacts be compensated? Who sets the level of compensation?
- How can the plant be integrated with other environmental uses and opportunities in the area (forestry, tourism, wilderness, recreational fishing)?
- Does the design of the plant recognize the environmental opportunities and constraints of the site?
- Does the plant meet federal, provincial, and local standards? What permits are needed?
- Who takes responsibility for long-term management?
- How and when is the public involved in management decisions?

How would enforcement and monitoring of the fish processing plant be handled?

- Who is responsible for ensuring that the plant continues to comply with environmental standards?
- How will the economic and social contribution of this development to the community and the region be measured?
- What ongoing effects need to be monitored? How often? With how much accuracy?
- Who pays for the monitoring?
- Who is responsible for appropriate responses to adverse effects?

ENDNOTES

[1] "At the turn of the century the streams and rivers of British Columbia often nurtured annual catches of between 300 and 360 million pounds of salmonids. The pioneers took this abundant resource for granted believing it would always be there, but today the fishery produces only half its former harvest" (Fisheries and Oceans, Ministry of Environment, **Salmonid Enhancement**, brochure).

[2] For additional reading see T. Gunton and I. Vertinsky, **Reforming the Decision Making Process for Forest Land Planning in British Columbia**, British Columbia Round Table on the Environment and the Economy, September 1990; and J. C. Day and J. A. Affum, **Toward Sustainable Water Planning and Management in British Columbia**, British Columbia Round Table on the Environment and the Economy, November 1990.

[3] "The world's one billion meat eaters and car drivers are responsible for the lion's share of the damage humans have caused to the common global resources" (L.B. Brown et al., **State of the World**, A Worldwatch Institute Report on Progress toward a Sustainable Society, W.W. Norton & Co., New York, 1991, p. 156).

[4] British Columbia Ministry of Crown Lands, **British Columbia Land Statistics**, 1989, p. 53.

[5] British Columbia Ministry of Finance and Corporate Relations, **B.C. Economic and Statistical Review**, 1990, p. 31.

[6] G. M. Bonner, **Inventory of Forest Biomass in Canada,** Canadian Forestry Service, Ministry of Supply and Services Canada, Ottawa-Hull, 1985, p. 9.

[7] Ibid., p.1, p. 16, and map 1.

[8] R. Cannings and A. Harcombe, eds, **The Vertebrates of British Columbia: Scientific and English Names**, Royal British Columbia Museum Heritage Record #20, Ministry of the Environment Wildlife Report #24, 1990.

[9] British Columbia Ministry of Environment, **Wildlife in British Columbia**, 1987, p.7.

[10] K. Vermeer et al., **Distribution and Densities of Marine Birds on the Canadian West Coast**, Environment Canada, Canadian Wildlife Service, Delta B.C., 1983, p. 71.

[11] K.W.G. Valentine et al., **Soil Landscapes of British Columbia**, British Columbia Ministry of Environment, 1981.

[12] This chapter is based on British Columbia Round Table on the Environment and the Economy, **The Structure of the British Columbia Economy: A Land Use Perspective**, 1991.

[13] Statscan 31-001

[14] British Columbia Ministry of Crown Lands, **British Columbia Land Statistics**, 1989, p. 23.

[15] British Columbia Ministry of Forests, **Annual Report**, 1988-89, p. 57.

16 The Greater Vancouver Regional District is 293,000 hectares in area.

17 The 1960 harvest is given as 1,199,842,862 cubic feet. This converts roughly to 34 million cubic metres (British Columbia Department of Land and Forests, **Report of the Forest Service**, 1960-61, p. 88).

18 British Columbia Ministry of Forests, personal communication, March 1991.

19 Assumes 35 cubic metre logging trucks, and 200 working days per year.

20 British Columbia Ministry of Forests, memorandum, March 1991, and personal communication, March 1991.

21 At the time of publication, the latest year in which complete forestry statistics were available for all of Canada was 1986. In that year British Columbia recorded a timber harvest of 77.5 million cubic metres (British Columbia Ministry of Forests) and had a forest industry work force of 74,300 (Statscan 25-202). In all of Canada, the total amount of timber logged was 177 million cubic metres (Forestry Canada, **Forestry Facts**, p. 30). The total work force in the Canadian forest industry in 1986 was 274,000 (Statscan 25-202). When the B.C. statistics are removed from the national totals, it reveals that the rest of Canada registered a timber harvest of 99.5 million cubic metres and a work force of 199,700. That is approximately two workers for every 1,000 cubic metres logged.

22 Forestry Canada, **Forest Facts**, 1990, p. 30; based on 1986 data, see endnote 21.

23 In 1989 the value of shipments generated by the B.C. forest industry was $12.5 billion. The Canadian total was $41.8 billion. The total value of all manufactured goods produced in British Columbia in 1989 was $25.9 million (Statscan 31-001).

24 British Columbia Ministry of Energy, Mines and Petroleum Resources

25 British Columbia Ministry of Finance and Corporate Affairs, Planning and Statistics Division, memorandum, March 1991.

26 British Columbia Ministry of Crown Lands, **British Columbia Land Statistics**, 1989, p. 43-44.

27 British Columbia Ministry of Finance and Corporate Relations, Planning and Statistics Division, memorandum, March 1991.

28 The Tourist Research Group; Campbell, Goodell and Associates, **Visitor '89: A Travel Survey of Visitors to British Columbia**, prepared for Industry, Science and Technology Canada, British Columbia Ministry of Tourism, British Columbia Ministry of Regional and Economic Development, 1990, p. 5.

29 British Columbia Ministry of Finance and Corporate Relations, Planning and Statistics Division, memorandum, March 1991.

30 British Columbia Ministry of Parks, **Parks Plan '90**, 1990, p. 9.

[31] National parks 476,000 hectares; provincial parks 5.36 million hectares; regional parks 8,000 hectares; also the Ministry of Forests Wilderness Areas comprise 111,000 hectares (British Columbia Ministry of Crown Lands, **British Columbia Land Statistics**, 1989, p. 41).

[32] British Columbia Ministry of Finance and Corporate Relations, Planning and Statistics Division, memorandum, March 1991.

[33] A. Dorst and C. Young, **Clayoquot: On the Wild Side**, Western Canada Wilderness Committee, Vancouver, 1990, p. 103.

[34] British Columbia Ministry of Finance and Corporate Relations, **B.C. Economic and Statistical Review**, 1990, p. 102.

[35] British Columbia Ministry of Finance and Corporate Relations, **B.C. Earnings and Employment Trends,** January 1989.

[36] British Columbia Ministry of Finance and Corporate Relations, Planning and Statistics Division, memorandum, March 1991.

[37] British Columbia Ministry of Crown Lands, **British Columbia Land Statistics**, 1989, p. 30.

[38] Ibid., p. 20 -22.

[39] Price Waterhouse, **The Economic Impacts of Fishing in British Columbia - 1988-1989**, prepared for Fisheries Council of British Columbia, 1990, p. 36.

[40] Ibid., p.3, p.6, p.11.

[41] British Columbia Ministry of Finance and Corporate Relations, Planning and Statistics Division, memorandum, March 1991.

[42] British Columbia Ministry of Finance and Corporate Relations, **B.C. Economic and Statistical Review**, 1990, p.104.

[43] British Columbia Ministry of Finance and Corporate Relations, Planning and Statistical Division, memorandum, March 1991.

[44] British Columbia Ministry of Agriculture and Fisheries, Aquaculture and Commercial Fisheries Branch.

[45] This section is based on R. Careless, **Incorporating Environmental Performance Indicators into National Income Accounts**, British Columbia Round Table on the Environment and the Economy, 1990, p.18.

[46] **Population Today**, Population: Readings for Senior Secondary School Studies, Victoria International Development Education Association, May 1988, p.2.

47 P. Ngan, **British Columbia Population Forecasts and Issues,** British Columbia Round Table on the Environment and the Economy, 1990, p.4.

48 Hon. G. Sloan, **Report of the Commissioner Relating to Forest Resources of British Columbia**, Queen's Printer, Victoria B.C., 1956, p.17.

49 British Columbia Ministry of Finance and Corporate Relations, **B.C. Economic and Statistical Review,** 1990, p.137.

50 In addition to the 19 claims accepted for consideration by the government of Canada, three more claims are under review, six more claims are anticipated in the future, and three claims originating in Alberta and the United States spill over into British Columbia. Taken together, all of the above claims cover as much as 95 per cent of the provincial land area (Federal Department of Indian and Northern Affairs, Office of Native Claims).

51 Natural Resource Management Program, Simon Fraser University, **Wilderness and Forestry: Assessing the Cost of Comprehensive Wilderness Protection in British Columbia**, 1990.

52 Canadian Institute of Planners, **Reflections on sustainable planning: Implications of sustainable development for planning and the Canadian Institute of Planners**, discussion paper based on a workshop held in Montreal, September 7-9, 1990.

53 British Columbia Ministry of Crown Lands, **British Columbia Land Statistics**, 1989, p. 41.

54 J. E. Vance, **Tree planning: A Guide to Public Involvement in Forest Stewardship**, Public Interest Advocacy Centre, Vancouver B.C., 1990.

55 Agricultural Land Commission, **An Overview Report**, Burnaby, B.C., February 1990.

56 Assumes that the disturbed area is 10 m wide. Licensee roads, also called operational roads, are built by forest tenure holders. Non-status roads are in areas of provincial forest where logging operations have ceased. Non-status roads are neither claimed nor maintained by any company or agency (British Columbia Ministry of Forests Engineering, personal comment, 1991).

57 Based on B.C. Hydro estimates of 5,344 km of 500 kV lines, 3,539 km of 230 and 260 kV lines, 4,498 km of 138 kV lines, and 3,675 km of 60 kV lines. An average 57 m right-of-way has been used to calculate areas of 230-500 kV transmission lines, 25 m for 138 kV, and 15 m for 60 kV (B.C. Hydro, personal comment, 1991).

58 Assumes an average clearing width of 5 m.

59 1983-1990 data; does not reflect lines existing prior to 1983; assumes a clearing width of 7 m.

60 Includes the following:

- Major mine roads, which are built on Crown Lands by the Ministry of Energy, Mines, and Petroleum or by mining companies (570 km, and 1,700 ha).
- Other mining roads (mine access, development, and some exploration roads) that obtained some provincial funding for construction (approximately 7,000 km, and

7,000 ha). Lengths of exploration roads built by private companies and roads on mine tenures are not available.

- Roads serving British Columbia Provincial Parks (1,000 km, and 2,000 ha).
- Roads administered by the Ministry of Crown Lands under work permits or licenses of occupation (330 km, and 700 ha).

[61] Lakes that have been enlarged by hydroelectric dams constitute an additional 290,000 hectares, but the extent of enlargement is unknown, so only reservoirs formed by dams on rivers are included in this table (Water Rights Branch, Power and Special Projects Section, Ministry of Environment; Greater Vancouver Regional District; Greater Victoria Water District).

[62] Assumes an average double track mainline width of disturbed area of 25 m. (W. Kemball, ed., **The New Canadian Oxford Atlas**, Oxford University Press, Don Mills, Ontario, 1985).

[63] I. Nair, M.G. Morgan, and H. Keith, **Biological Effects of Power Frequency Electric and Magnetic Fields; Background paper,** OTA-BPE-53, Congress of the United States, Office of Technology Transfer, Washington, D.C., 1989.

[64] J. C. Day and J. A. Affum, **Toward Sustainable Water Planning and Management in British Columbia,** British Columbia Round Table on the Environment and the Economy, November 1990.

[65] Bulk export of water by marine transport. List of applications under consideration (British Columbia Ministry of the Environment, Water Management Branch, Water Licensing Section, February 1991).

[66] Section 4 of the Ministry of Forests Act (R.S.B.C. 1979, c. 272).

[67] Sustained yield is "...a perpetual yield of wood of commercially usable quality from regional areas in yearly or periodic quantities of equal or increasing volume" (Hon. G. Sloane, **Report of the Commissioner Relating to Forest Resources of British Columbia**, Queen's Printer, Victoria, B.C., 1956, p. 222).

[68] J. E. Vance, **Tree Planning: A Guide to Public Involvement in Forest Stewardship**, Public Interest Advocacy Centre, Vancouver B.C., 1990.

[69] Forest Act, Section 7. (3) (a), establishes the criteria used to set "the rate of timber production that may be sustained on the area."

[70] British Columbia Ministry of Forests, **Annual Report 1988-89.**

[71] British Columbia Ministry of Forests, personal communication, March 1991.

[72] **Schedule for reports on water quality objectives and criteria**, information sheet, British Columbia Ministry of Environment, Water Quality Branch, Water Management Division, November 5, 1990.

[73] **Guidelines for watershed management of Crown lands used as community water supplies**, British Columbia Ministry of Environment, Task Force on Watershed Management, October 1980.

[74] British Columbia Ministry of Forests, **Managing Wilderness in Provincial Forests: A Policy Framework**, Integrated Resources Branch, Recreation Section, 1989.

[75] British Columbia Ministry of Parks, **Striking the Balance: B.C. Parks Policy,** 1990.

[76] National Parks Act, Section 5 (8)

[77] British Columbia Ministry of Parks, **Striking the Balance: B.C. Parks Policy**, 1990.

[78] British Columbia Ministry of Forests, Integrated Resources Branch.

[79] Kurt Seel, Senior Resource Management Planner, Canadian Parks Service, Calgary, personal communication, December 1990.

[80] Hans Roemer, British Columbia Ministry of the Environment, Victoria, B.C., personal communication, February 1991.

[81] B. Devall and G. Sessions, **Deep Ecology: Living as if Nature Mattered**, Peregrine Smith Books, Salt Lake City, 1985.

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The British Columbia Round Table on the Environment and the Economy welcomes your comments on this paper, either in writing or at a public meeting. Please feel free to tell us your views on the issues raised in the search for a sustainable development strategy for British Columbia.

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